73 AMATEUR RADIO

International Edition

JUNE 1990
ISSUE #357
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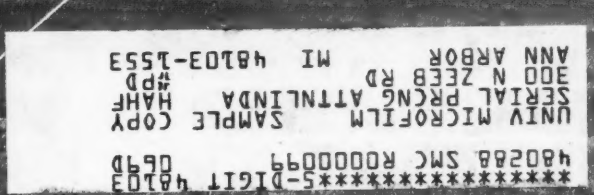

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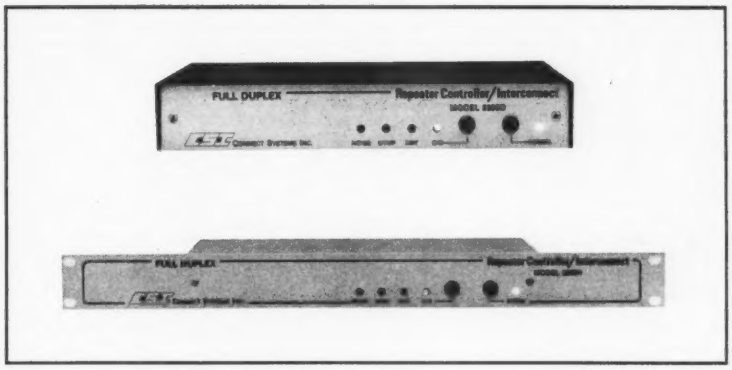

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LETTERS

From the Hamshack

Dear Wayne

Jim Kocsis WA9PYH: It looks like what you said about selling the RF spectrum is a real possibility. People who don't think we could lose spectrum space should read page 15 of the February *RF Design* magazine. Oh well, this is just a hobby, right? Keep up the good work at *73 Mag*.

I'm saving to bid for 3 kHz on 220... Wayne.

Jeff Markel KD2HN: I've been almost completely QRT for most of the last ten years. Part of that is due to family time and money constraints, but most of it can be attributed to the senility of ham radio. As you have written over and over, most hams seem to be over 60, so their interests and concerns are not mine. I'd like to rag chew with folks my own age. Age isn't the only problem. Every time I've tried hamming I've been turned off by rag chews which amount to name, weather, rig and 73s. Any attempt at a real conversation brings, "Well, it's been a real nice QSO. 73 and see you down the log." It was simple, too discouraging. An up note... I recently came across some hams close to my age in my area, so maybe I'm back. I've got a TNC coming and, for the first time in years, am thinking of upgrading.

Eugene Drake N6ORO: Why doesn't ham radio grow? Ask my son. He's 23, has an Advanced ticket and proctors VEC exams. When the fellows he's Elmered have tried the HF bands, they are pushed off by: "It's time for our net now, please move." Never an offer to join the net as a guest. I'm going to try packet. Keep rattling the cage, Wayne.

I hate that too. When some officious op comes on and demands I move because I'm on the frequency of a net which will be starting soon, I'd like a 50 kW amplifier and a rhombic for his direction... Wayne

Joel Jones W4JQB sent a clipping about the Agilis packet spread spectrum module getting FCC approval. This service will "share" our 902–28 MHz band. Well, as we lose more of the band to commercial developers, there's an opportunity for ham entrepreneurs to go into business. Says Joel, "I remember your campaign back in the '70s to save 220, but look what happened. Looks like the ARRL, with their current initiatives (or lack thereof), is stomping ants on the front porch while elephants are coming in the back door."

Steve Uhrig W3SWS sent a brochure from L-Tronics about the new Personal Emergency Locator Transmitter (PELT) service the FCC has proposed for the 220–222 MHz band they just took away from us. It looks as if the FCC doesn't know just what to do with it. Well, like the 902 packet deal, at the least this is another good opportunity for ham entrepreneurs to use their technical smarts and get into the PELT business. The idea is to set up systems to help lost or hurt hikers.

Bob Kern KL7NC: I've been meaning to write you concerning the various topics you've talked about in your editorials over the years I've been reading your great magazine. The March editorial about desktop publishing and your new publication idea really got my juices flowing. We bought our first Mac four years ago, then bought another and another. We now produce our weekly paper on the Macs. They're easy to use and have saved us thousands of dollars. The paper has enabled us to buy a three-story building and feed eight families. Two or three people, a small office, a couple Macs and a LaserWriter are all that's needed. Now, that confounded ARRL Automatic Station proposal... have they gone truly bonkers, or are they just trying very hard to kill the wild-fire growth of the packet/AMTOR message handling system in favor of their old NTS system? In spite of needed improvements, packet is the most efficient traffic-handling system yet devised for ham radio. Since putting my PBBS on the air 8 months ago, it has handled nearly 15,000 pieces of traffic to and from other automatic stations up and down the West Coast... and my little station is just a spur off the main traffic networks. N6VV handles that much traffic in a month! The ARRL's proposal to jam all the packet, RTTY and AMTOR automatic stations into 10 kHz sections of each band is shear madness. The 40m proposal (7030–7040 kHz) is particularly diabolical in that it will bring the CW people into the fray as well.

Could the proposal's main purpose be to protect the rapidly fading old ARRL traffic net system? It makes sense to me... Wayne

Jack Goldsworthy KA6EPF: The Santa Barbara ARC has just started new classes, with 30+ in the Novice class. Many are under 21. We also have a class in a private school. We're trying to do it right. I'll have pictures later.

Send the pictures, send the pictures... Wayne

Jeff Kinsman NH6VH: As I am a new Technician, you may be interested in my perspective. Amateurs seem to be a rather closed society... they don't volunteer much information about the hobby. I had to really hunt down someone to help me with my ticket to break into the hobby. The local club didn't provide any classes. Now, the code... I truly believe that code is holding the hobby back. Technology had outdated the code. It belongs with other outdated facets, like crystal sets and tubes. It's fun to play with and be nostalgic about, but out of the mainstream. Forcing people to learn the code to pass the exam needlessly burdens our hobby and is jeopardizing our future. How long will the FCC hold bands open that we aren't using?

"Gib" Gibson W7JIE: Thank you for your many "good" editorials... particularly April, where you mentioned amateurs' poor showing in public service. For several years now Wayne Moddison K6DOW and I have been publishing a small booklet which lets hams know about the public service events around Seattle. There are 52 listed, along with who to call and their phone numbers, for those interested in participating. We have over 3,000 hams around here. How many help? Never enough for the need. The booklet was first put out at our expense, but this year ICOM picked up the tab in return for an ad on the back cover. We also list all the local repeaters. At least out here we're doing something about public service and ham participation. Note, on Aug. 3rd there is a Seafare Torchlight Parade. This alone takes 60 hams to provide the communications needed... and we do it! How do we get publicity for all the work we do? Our two ham PR experts are "retired and too busy," so we go ahead and do it anyway.

The booklet is a great move... good use for desktop publishing. But every club needs to appoint PR people and see that they get news of public service activities to the newspapers, radio and TV media. Think of public service having two objectives... one to help, the other to advertise amateur radio and help interest youngsters in our great hobby. I suppose I'll have to write more editorials on how to get PR. Just what you wanted, more of Wayne's editorials... Wayne

Klaus Spies WB9YBM: The state police gave me a warning for wearing an ICOM HS-10 headset. My explanations that it covers only one ear were ignored.

Check the law and see if it says headphones are illegal... note the "s." If a single headphone is illegal in Illinois you need a new law. The human ear system is incredibly efficient when it comes to separating sounds. You can have deafening music in one ear and still hear a pin drop with the other. If one headphone is illegal that's crazy. The idea is to force motorists to be able to hear car horns. I don't see any difference between a one-phone headset and a car telephone handset... and either beats the heck out of expecting to hear traffic sounds over some car audio systems, which are up there in hearing loss levels. Let's check the state car laws and get 'em cleaned up if they are out of touch with technology... Wayne

Dick Banter KB7DKT: What is needed is more how-to material. Something like your CB to 10m articles, but covering 6m, QRP and so on. It's a hassle to get all the parts.

We're trying to get as many projects as possible backed up with parts kits such as those from Ramsey and A & A Engineering... Wayne

Lawrence Guerrera NX2V: OK, Wayne, here goes. This is the first time I've ever written to a magazine, but I feel compelled to say: I agree with everything you have said in your editorials and I enjoy them! Now the bad news. In my area there is a ham club which meets every two months. Why? Most of the members are old-timers and have nothing better to do, so once a month is out of the question. What are they doing in terms of getting new hams into our ranks? Nothing, as far as I can see. Is no-code the answer to all this? Absolutely not! Am I for no-code? Absolutely yes! And I'm one of those hams who did it the hard way, from Novice to Extra step by step.

Matt Burgess WA4JDY: I used to think of you as that proverbial doomsayer in New Hampshire, a sort of crackpot with a ham ticket. I owe you an apology. I have begun to realize that all the things that I thought were baloney coming from you were right on the money. I dug out the last year of *73* and reread every one of your editorials [*Gasp!... Wayne*]. You are hitting the mark a good 95% of the time. Please keep it up. I am busy trying to get other local hams to check out your ideas and give them a chance. Obviously nothing else has worked over the past decade, so what have they to lose?

Richard Davis W9KK: I've been in radio and electronics since 1938 and have experienced most of the things on which you've commented. I've seen a lot of changes and I've had to change constantly to keep up with the advances. The military services and the US government are changing, too. They are not teaching, wanting or using electronic technicians as we knew them. They are going toward circuit board replacers.

James Arconati KE0QU: I remember when you talked about FM and repeaters, and I thought, "Maybe there will be a few users who are interested." I modified a T43 and watched as the whole nature of VHF amateur radio changed. You started telling us about personal computers and the opportunities there. I bought an Apple II and had a ball, but missed the dollars I could have made. When you said satellite TV was a winner, I was already building an earth station, but I wasn't ready to follow your advice and make some money. Through the years your ideas have taken a few energetic individuals to new heights of success. Your own efforts have certainly changed ham radio and many areas of the electronics industry. Your offer in the March issue hit me at the right time.

Richard Ashley N5IZC: I'm in agreement on license fees. Few hams realize how much a few dollars would probably help the FCC take a bit more notice of amateurs and think us less a nuisance. If you can spend hundreds or thousands of dollars on transceivers and antennas, what's a few bucks for a license? If you want something, you should be willing to pay a little for it.

Steve Smith WA6SOC: Thank you for your magazine! Otherwise I would assume that ham radio is really as outdated and boring as most of the on-the-air conversations are. You are correct about RTTY and packet being where the action is. One reason is that these modes require us to compose our thoughts and reiterate them in a logical manner (something you don't find too often on 75m phone). Re getting newcomers, many people I invite into my shack are either frightened by the complexity of the equipment or unable to muster any enthusiasm for such an arcane hobby. I wonder if the code-free license would even have any takers? Keep up the good fight. Some of us actually do care.

Subscription problems do occur, accompanied by highly irritated letters from the injured. Let me spell out the facts of magazine life in the '90s. When I started 73 in 1960 the subscription rate was $3 a year. If we'd kept up with inflation that would be about $60 a year now. Instead, we use the best fulfillment service we have been able to find (in Colorado) and have been able to keep our rates to under $20 through automation and computerization. This means much less customer service and the frustrations of dealing with a computer when you don't pay on time, send a slightly wrong QTH, etc. If you send the $60 we'll personally handle your subscription, just like we did 30 years ago. Otherwise, if a problem develops, be patient and we'll eventually get the confounded computer system working for you. I see another huge postal rate hike coming, so obviously subscription rates will have to go up again. I really hate what they've done to foreign postage... which used to be very reasonable and now is absolutely ridiculous... when, oh when, will Congress allow private competition into this stupefying mail monopoly?... Wayne

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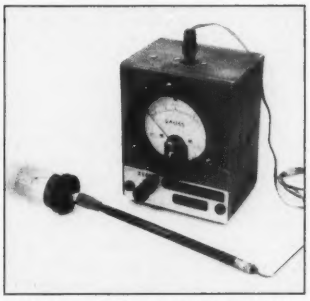

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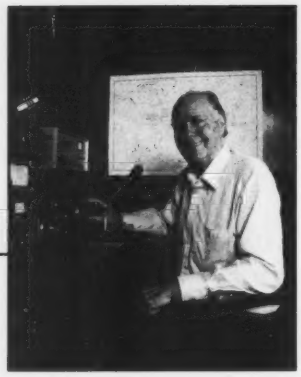

NEVER SAY DIE

Wayne Green W2NSD/1

220—Now What?

When the FCC took our 220–222 MHz away for UPS, the big deal was that UPS would be using an amplitude compandered SSB narrow-band system. I said baloney, ACSSB has never worked worth a hoot, despite tub-thumping *QST* articles on it... and even a section devoted to it in *The ARRL Handbook*. Sure enough (snicker), UPS hasn't been able to make it work and is reported to be turning to NBFM. This has got to be enormously embarrassing for whoever in the FCC did the spaghetti job on the rules when they took the two MHz away from us and then got the new commissioners to stonewall the situation.

I suspected something had gone seriously awry with the UPS deal when the FCC started frantically looking for something else to justify taking our band...like an emergency locator transmitting system (ELTs) for hikers.

No-Code—Again? (Ho Hum)

The FCC has again (sigh) proposed a no-code license (RM9055). Well, to be just a tad more accurate, they've moved the recent ARRL no-code petition fairly intact into rulemaking. Should I gloat? Nah...but I can't help grinning smugly. And wonder of wonders, since this was Invented Here (as opposed to Not Invented Here...NIH), I doubt the League will cudgel their member clubs to rise up en masse in horror this time...the tactic which so thoroughly defeated the last FCC no-code try. You've probably already forgotten about that, right? In another year it'll never have happened.

By now you should know my no-code opinions, but you probably don't. I explain them at hamfest talks and amaze hundreds of listeners when I repeat what I've written so many times in my editorials. Ask me what I think about no-code. OK, lucky you asked. I think a no-code license which appears to offer some real benefits to beginners will make it easier to get new hams licensed...but only after we've managed to attract them to our hobby.

The ARRL/FCC proposal sure doesn't offer much. The proposed Communicator license would be good only above 222 MHz. The good news is that all future newcomers won't find many hams to talk with way up there. What few are there generally use those bands for remote repeater control or linking, and would likely welcome Communicators like a new case of intermod. We're talking hostile territory, with very few friendly natives. Just what we need to encourage the newcomers to our great hobby.

So other than having to buy ham gear which will be of little use when they upgrade their tickets, having no one much to talk with, and being restricted to short-range contacts, what benefits do we have to offer Communicators? Remember, this'll be the only entrance path to the hobby. That ought to quickly cull out 99% of those dumb enough to bother getting a license. We may be able to cut down on the present pathetic trickle of newcomers even further this way.

If the ARRL's secret agenda was to finish off what's left of amateur radio, they could hardly have come up with a better rulemaking proposal...nor submitted it at a better time.

But let's say that, as usual, Wayne is dead wrong. Let's say that the Communicator license does offer enough fascinating operating to keep newcomers coming into the hobby and that, encouraged by the fun they're having on our UHF bands, they do eventually learn the stupid code and upgrade. Let's say that they don't bog down almost totally as the Technician Class has. Let's say that for some reason which is completely unimaginable to me right now, they do upgrade...what do we have then?

Unless we are somehow able to attract youngsters to the Communicator license, we won't be much ahead of where we are right now. And that means we are going to have to make the biggest basic change in amateur radio in history. We're going to have to start advertising and promoting our hobby...selling it to youngsters like any other product. This means building our visibility so youngsters will be aware that amateur radio exists. It means mercilessly promoting it in every available medium.

We sit grumbling because our kids are playing with computers instead of hamming. Gee, how did that happen? Well, it wasn't God; it was good old-fashioned advertising and promotion. It's called marketing these days. The computer companies are spending tens of millions to make sure that kids are playing with Nintendo and computers...and we're spending zilch or less to sell 'em amateur radio. Tell me money doesn't talk.

Sure, ham radio is a nonprofit hobby. Well, fine, we're going to nonprofit ourselves right out of business. Nintendo and the other computer games don't hold a candle to the fun of amateur radio. Worse, hamming used to get 80% of our newcomers into high tech careers. What does Nintendo prepare kids for, other than McDonalds table wiping? Thank heavens the minimum wage has just been raised!

If we ever do decide as a group to make an effort to take advantage of the PR opportunities which are open to us, we'd better have an attractive no-code entry ticket available, not the proposed Communicator Class. I'd sure like to see it with at least the Novice phone privileges.

We have ham moles in radio and TV stations everywhere, so we could get tons of free exposure. What we lack is an organization to generate the material. What little has been done so far has been absolutely terrible...more a turnoff than a turn-on for newcomers. Every time the ARRL has invested big bucks in a PR video, they have been unable to prevent themselves from turning it into a self-congratulatory epic instead of a commercial selling the benefits of hamming. Sure, we hams love to see videos telling us how great we are. But kids need to see videos on how they can have fun, not how a few obviously wealthy hams are enjoying talking with the world from their zillion dollar stations. Wrong message.

Since it would be substantially more difficult technically than the Novice test, the proposed Communicator Class license exam would be like starting out as a Tech, only without that dreadful 5 wpm code requirement. How much would the added technical requirement tend to inhibit newcomers from getting this license? The only difference between the Tech and the General license is code, so essentially we'd have beginners starting out on an equal footing with Generals, except that their code skill lack would prevent them from using the normal Novice, Tech, and General bands. Wouldn't this disparity tend to put more emphasis than ever on the perceived importance of the code as an obstacle? Yet the basic reason this new license was proposed was in recognition of code's irrelevance to commercial and military communications in the '90s. There's something gone really wrong with what's happened as opposed to what we desired and expected.

How About...

The proposed Communicator license does have the benefit that it would replace the Novice and Tech licenses. Well, almost. There's a proposed /AC suffix for Communicators who pass the 5 wpm code test. This will permit them to use the Novice and Tech bands. Talk about waffling, good grief!

With the hobby gradually withering away, perhaps it's time to shuck off the kluge structure that's been jerry-built for us. I like the idea of combining the Novice and Tech licenses. And, to my mind, the 5 wpm code test is only two or three hours of effort away from no code test at all, so what's all the fighting about? Let's make the entry license no-code and, as with the proposed Communicator, give the Tech level test.

Our Advanced Class is left over from the old Class A. Let's combine it with the Extra, and be done with it. We don't give the Extras all that many additional frequencies, anyway. That would give us about 150,000 Advanced/Extra Class licensees. Let's just call 'em Advanced Class...and keep the code requirement at 13 wpm. Remember, even the ARRL agreed in their Communicator petition that the code isn't as important as it used to be.

Then, if we lump the General and Techs together...again, the only difference between the classes is the code requirement...and add in the Communicator which is also technically equivalent, and we'll have a new General Class with about 220,000 licensees. That'll get us down to three classes, with about the right number per group. 90,000 Novices, 220,000 Generals, and 150,000 Advanced.

It's the old Keep It Simple (KISS) approach. Haven't we suffered enough from our caste system? What do we think we are, India? And look at the mess castes have made there!

Where's NIAC?

My original intention was to try and get the ham industry to cooperate in order to build a small National Industry Advisory Committee which could work with the FCC toward rebuilding our hobby.

Two problems came up. One was the almost complete lack of interest on the part of the ham industry in supporting an advisory group. Fewer than 25 of the over 750 ham industry firms volunteered to help...a matter of investing $100. The other was President Bush's incredible delay in appointing new commissioners.

The last of the new commissioners had just barely learned where their offices were when the Communicator

Continued on page 80

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The Future is Here!

Kenwood — producing the finest Amateur Radio products for over three decades — introduces you to our world of affordable, high-quality, high performance products for today's active Radio Amateur. From HF to VHF, from base to mobile to HT, there's surely a Kenwood radio that will fit your needs and budget.

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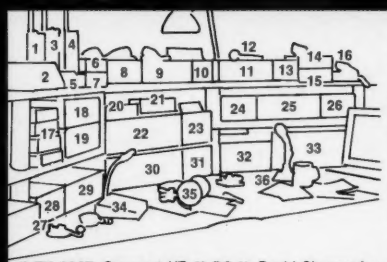

1) TH-26AT: Compact HT. **2) BC-11:** Rapid Charger for TH-26AT. **3) TH-315A:** 220 Deluxe HT. **4) TH-75A:** Dual Band HT. **5) BC-10:** Compact Charger. **6 & 7) TM-631A/731A:** 144–220/144–450 MHz FM Dual Banders **8) PS-50:** Heavy Duty Power Supply. **9) TS-440S:** HF Transceiver w/AT-440 (shown w/supplied MC-43S). **10) SP-430:** External Speaker. **11) R-5000:** High Performance Receiver. **12) HS-6:** Small-size Headphones. **13) SP-430. 14) TM-2530A:** Deluxe 2m, 25 W FM Transceiver (w/optional MC-48B mic.). **15) TM-3530A:** Deluxe 220 MHz, 25 W FM Transceiver. **16) TM-701A:** 144/450 MHz Compact Dual Bander Mobile Transceiver. **17) TM-231A/331A/431A/531A:** 144, 220, 450, 1200 MHz Compact Mobile Transceivers. **18) TS-811A:** 70 cm, 25 W and **19) TS-711A:** 2m, 25 W, All Mode Base Station Transceivers. **20) PC-1A:** Phone Patch (FCC part 68 Registered). **21) SW-2100:** SWR/Power Meter. **22) TS-940S:** Deluxe HF Transceiver w/AT-940 installed. **23) SP-940:** Matching External Speaker. **24) SP-31:** External Speaker. **25) TS-790A:** All Mode Tri-band Satellite Transceiver. **26) PS-31:** Matching Power Supply. **27) PS-430:** Power Supply. **28) AT-250:** External Automatic Antenna Tuner. **29) TS-680S:** 160-6 m Multi-Bander. **30) TS-950SD:** HF Transceiver w/DSP. **31) SP-950:** Matching External Speaker. **32) SM-230:** Deluxe Station Monitor. **33) TL-922A:** HF Linear Amplifier. **34) MC-85:** Multi-function Desk Mic. w/3 outputs and tone controls. **35) HS-5:** Deluxe Headphones. **36) MC-60A:** Base Station Mic.

As the "pacesetter" in Amateur Radio, Kenwood continues to incorporate tomorrow's techniques and innovations into practical products today. Digital Signal Processing (DSP) in the TS-950SD is only one example. SSB Slope Tuning, the original "Dual Bander" concept, built-in antenna tuners for HF rigs, and many other techniques were all developed by Kenwood, and imitated by others. Leading edge technology, and superior field-proven performance — That's the Kenwood Experience!

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All-mode tri-bander!

TS-790A

Satellite Transceiver

The new Kenwood TS-790A VHF/UHF all-mode tri-band transceiver is designed for the VHF/UHF and satellite "power user." The new TS-790A is an all-mode 144/450/1200 MHz transceiver with many special enhancements such as automatic uplink/downlink tracking. Other features include dual receive, automatic mode selection, automatic repeater offset selection for FM repeater use, VFO or quick step channel tuning, direct keyboard frequency entry, 59 memory channels (10 channels for separate receive and transmit frequency storage), multiple scanning and multiple scan stop modes. The Automatic Lock Tuning (ALT) on 1200 MHz eliminates frequency drift. Power output is 45 watts on 144 MHz, 40 watts on 450 MHz, and 10 watts on 1200 MHz. (The 1200 MHz section is an optional module.)

- **High stability VFO.** The dual digital VFOs feature rock-stable TCXO (temperature compensated crystal oscillator) circuitry, with frequency stability of ±3 ppm.
- **Operates on 13.8 VDC.** Perfect for mountain-top DXpeditions!
- **The mode switches confirm USB, LSB, CW, or FM selection with Morse Code.**
- **Dual Watch allows reception of two bands at the same time.**
- **Automatic mode and automatic repeater offset selection.**
- **Direct keyboard frequency entry.**
- **59 multi-function memory channels.** Store frequency, mode, tone information, offset, and quick step function. Ten memory channels for "odd split."
- **CTCSS encoder built-in.** Optional TSU-5 enables sub-tone decode.
- **Memory scroll function.** This feature allows you to check memory contents without changing the VFO frequency.
- **Multiple scanning functions.** Memory channel lock-out is also provided.
- **ALT—Automatic Lock Tuning—on 1200 MHz eliminates drift!**
- **500 Hz CW filter built-in.**
- **Packet radio connector.**
- **Interference reduction controls:** 10 dB RF attenuator on 2m, noise blanker, IF shift, selectable AGC, all mode squelch.
- **Other useful controls:** RF power output control, speech processor, dual muting, frequency lock switch, RIT.
- **Voice synthesizer option.**
- **Computer control option.**

Optional Accessories:
• **PS-31** Power supply • **SP-31** External speaker • **UT-10** 1200 MHz module • **VS-2** Voice synthesizer unit • **TSU-5** Programmable CTCSS decoder • **IF-232C** Computer interface • **MC-60A/MC-80/MC-85** Desk mics • **HS-5/HS-6** Headphones • **MC-43S** Hand mic • **PG-2S** Extra DC cable

Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications, features, and prices are subject to change without notice or obligation.

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QRX . . .

EDITED BY LINDA RENEAU KA1UKM

SatelLife Packet

Lack of timely medical information is a leading cause of death in the developing world, according to global health experts. SatelLife, a not-for-profit organization based in Cambridge, Massachusetts, and Moscow, is working to correct this problem by using PacSats, low-altitude store-and-forward satellites, and briefcase-size packet ground stations. With a ground unit costing about $2,000, a health worker in the field can receive and transmit instructions, consultations, and messages.

Following the December 1988 Armenian earthquake, SatelLife facilitated the delivery of packet radio equipment to disaster workers, helping locate more than 6,000 people. In 1989 a SatelLife healthlink was established between medical workers from Moscow's Ninth Children's Hospital and specialists from the Shriners Burn Institute in Boston. This link, in cooperation with the San Francisco/Moscow Teleport, is now allowing American burn experts to consult with Soviet physicians on the treatment of young victims of a recent Soviet train wreck.

Most recently, SatelLife has agreed to provide direct satellite transmission of urgently needed medical information to Polish physicians, according to Executive Director Dr. Charles Clements. This is the first medical information retrieval service to use direct satellite transmission. SatelLife will provide the Central Medical Library in Warsaw with USATs (Ultra-Small Aperture Terminals) first, and eventually provide each medical academy and institute in Poland with them. The USATs, connected to FAX machines, will receive medical data from the privately owned Pan-American Satellite-1. Microspace Communications, a subsidiary of Capitol Broadcasting Company that has donated three years to this project, will provide transmissions to Europe and the US.

The one-year-old organization, overseen by an international board of distinguished scientists and physicians, is in daily contact with its office in the Soviet Union. Through a 1987 agreement, the Soviet Academy of Sciences will launch SatelLife's satellites free of charge. For more information, call (617) 661–6468. *TNX Sharyn Cooper, Cudaback Strategic Communications, 11-B Mt. Auburn St., Cambridge MA 02138.*

Dove Crisis Averted

Last March 14, AMSAT learned that the DOVE Microsat on-board computer had crashed. The DOVE transmitter was in a key-down condition, blocking the uplink command channel. This inhibited the normal on/off cycling of the transmitter. Only a carrier with minimal packet data was being sent on the 145.825 MHz general downlink.

On March 17, Dave Blaschke W5UN and Microsat guru Bob McGwier N4HY helped solve the problem. N4HY owns what is believed to be the world's largest private 2m antenna, which he uses for moonbounce operation. He transmitted a reset command sequence to DOVE, his 32.5 dBi array providing nearly 2 MW (megawatts) EIRP.

AMSAT members carefully restored control of the spacecraft at the optimum time in the battery cycle, and commanded the S-band transmitter on. Telemetry from the S-band downlink will be analyzed for clues that might help in understanding the circumstances surrounding the software crash. DOVE controllers advise that the 145.825 transmitter will be off the air until new software can be loaded.

The DOVE (Digital Orbiting Voice Encoder) concept was formulated by Dr. Junior de Castro PY2BJO of Brazil AMSAT (BRAMSAT). It was inspired by the educational use made of the Russian-Canadian Skitrek operation carried out on UO-11 during the Winter/Spring of 1988. The idea was to produce a satellite capable of transmitting synthesized voice and common digital modes in a widely available frequency band, such as FM. *TNX W5YI Report and QCWA Journal.*

What's Happening to 220?

The United Parcel Service may be on the verge of dropping ACSSB (amplitude compandered single sideband) and going to FM in its recently purchased 220 to 222 MHz. II-Morrow, the UPS subsidiary building the ACSSB gear, is having trouble making it work properly. Reportedly, the pilot tone that locks the system will not accept a 200 cycle drift. Rumor has it that II-Morrow may soon announce that the radios will be FM with 2.5 kHz channel spacing.

One of the primary reasons the FCC gave for reallocating 220–222 MHz to land mobile was for its use in development of new, narrow band technologies. If they end up using FM, a congressional investigation of UPS, II-Morrow, and the whole procedure used in transferring the spectrum might well be in order. *TNX Watts New.*

Romania: Ham Gear Needed

Hams in Romania need donations of amateur radio gear to get their nation back on the air. After the revolution, it became apparent that most of the amateur equipment in Romania had been destroyed. They need practically everything, from working radio gear and transformers to parts and components, and even coaxial cable.

Responding to an appeal from YO3CD, Alec Allen GM5VS of Amcomm Corp. has offered the organization's London location as a central collection point for donations. He will also arrange for transportation of the donations to Bucharest.

Any contribution must be *well-cushioned* to prevent damage in shipping, and securely packaged. It must also include a QSL card from the sender, to permit a return card from the recipient. All packages will be passed unopened, except possibly by customs inspectors.

Send donations to Romanian Appeal, Alec Allen GM5VS, %Amcomm, 373 Uxbridge Road, Acton, London, WR3 9RH, United Kingdom. *TNX Amateur Radio Newsline.*

Don't Get Zapped!

Lightning is lightning, but is it the same everywhere? No, it isn't, according to Richard Orville, an atmospheric scientist working at the State University of New York in Albany. Orville used a satellite network of detectors to analyze lightning along the East Coast in 1988. His findings were reported in the January 1990 issue of *Nature*, and later in *Horizons*, a newsletter from Best Power Technology, Inc.

In a study of five million lightning strikes, the average current in a Florida lightning bolt was 45,000 amperes. In comparison, New England lightning bolts averaged "only" 25,000 amperes. To put this in perspective, the average home uses a 200 amp service for the microwave, TV, heating and cooling systems, electric stove, and garage door opener.

The Tampa, Florida, area has been known as the "lightning capital of the world." There, according to the US Weather Service, storms produce an average of 1,300 strikes a day during the summer thunderstorm season.

As many hams have discovered, knowing the properties of lightning and how to protect yourself, other people, and your equipment, is an important topic. *TNX to Paul Marshal K4AVU.*

ARRL to Fight for Novice?

In PR Docket 90-55, the FCC proposes abolishing both Novice and Technician Class licenses, and replacing them with the Communicator Class license. The ARRL says that this proposal differs substantially in philosophy from what the League had envisioned. In the February 1 edition of the *ARRL Letter,* Executive Vice President Dave Sumner K1ZZ noted, "While the League will not have an official position on the FCC proposal until one is adopted by the Executive Committee or Board, it is fair to say that we have long placed great importance on the . . . Novice license as a means of entry into amateur radio."

Sumner said it wouldn't be an overstatement that in the past as well as in the present, the League deems the Novice license as essential, but he cautioned that the amateur community might want to wait and study the entire text of the FCC's no-code license proposal before taking a stand.

Sumner did not mention any need to retain the Technician Class license. Most observers feel that the ARRL may use the Technician Class as a bargaining chip, but view the Novice Class as a non-negotiable must.

For the past few years, the Technician Class has been the fastest growing of all license classes, an unforeseen result of splitting Element 3 into 3A and 3B for Novice Enhancement. Indications are that in another few years, the Technician Class could become the dominant license class and weld the most political force in the amateur radio community. *TNX Amateur Radio Newsline.*

Ingenious Use for CW

In 1884, Thomas Edison, widowed and nearly deaf before age thirty, used his inventive genius to court and win his second wife, Mina Miller. He taught her Morse code so that they could communicate privately in the presence of friends, relatives, and Mina's younger, more handsome suitors. Even in the most crowded, noisy room, they could tap out private messages on one another's palm. This gave Edison an advantage none of the other suitors had!

Later that year, on an excursion in the mountains of New Hampshire with friends, Mina's family, and Edison's five-year-old daughter, Edison cut through the QRN with Morse and asked Mina to be his wife. She blushed as he eagerly waited for her reply, and tapped out "Yes." *TNX B-N-T Bulletin.*

Avoid Battery Mix-ups

Mixing alkaline and zinc batteries creates a pressure explosion when you connect several in parallel. The explosion is big enough to split the end cap of an explosion-proof flashlight and blow it off.

Of seven brands inspected, the Eveready Alkaline Energizer was the only battery incorporating a warning label about mixing battery types. Since it appears that major manufacturers are converting from carbon zinc to alkaline mix, the possibility of mixing battery types is increasing. To avoid this hazard, check your batteries. *TNX ESS-ZED Newsletter.*

Frequency Relocations

Novice, Technician, and beacon changes, possible and current! On March 1, based on petition RM-6594 by Bradley Wells KR7L, the FCC announced that it proposes to change authorized CW frequencies for Novice and Technician Class operators in the 80 meter band from 3700–3750 kHz to 3675–3725 kHz. Although at present Novices and Techs may only transmit CW in 3700–3750, Canadian stations use that segment for voice. Wells argues that this results in considerable QRM between US and Canadian stations, and that relocation would reduce interference in the 80 meter Novice segment. The FCC requests comments from the amateur community.

The FCC has amended its rules by relocating the frequency segments used by automatically controlled beacon stations operating in the 2m and 70cm amateur bands. This action is a response to an ARRL petition requesting that the beacon subbands be changed from 144.02–144.06 MHz to 144.275–144.300 MHz on 2m and from 432.07–432.08 MHz to 432.300–432.408 MHz in the 70cm band. The ARRL's request to relocate the 220 MHz beacon subband from 220.05–220.06 MHz to 220.275–220.300 MHz was denied. *TNX ARRL, Amateur Radio Newsline, and HALO.*

MIR Operations

Soviet cosmonauts Anatoly Soloviev U6MIR and Alexander Balandin U7MIR may have resumed amateur radio activity on MIR, the Soviet space station. According to AMSAT, reliable sources report that the cosmonauts are transmitting on 2 meters, primarily on 145.50, but they may also be found on 145.550 MHz. The most probable time of operation is after 18:00 UTC and anytime on weekends.

The report is that the new radio brought up by U6MIR and U7MIR wasn't functioning properly, and the cosmonauts were using the equipment left by U2MIR and U4MIR. It seems they plan to replace the nonfunctioning rig soon, possibly on an unmanned supply mission. *TNX AMSAT and Watts New.*

WARC-92 Committee

FCC Commissioner Sherrie Marshall and Francis Urbany, Director of International and Agency Relations, BellSouth Corporation, have been appointed co-chairpersons of the FCC's Advisory Committee for the World Administrative Radio Conference in 1992.

The Advisory Committee will counsel the commission on the preparations for WARC-92 and make and develop recommendations for the US proposals and positions on topics addressed at the conference.

ARRL Executive Vice President David Sumner K1ZZ has been named to serve as one of the 35 members of the FCC WARC Advisory Committee. Committee members, selected from both the business and academic communities, represent a diversity of telecommunications interests.

Waco Weather Watchers

If boughs are breaking in Waco, Texas, because of severe weather, chances are good the National Weather Service will be quickly informed by hams from the Heart of Texas Amateur Radio Club. Jim Lovett, the club's president, says, "The weather bureau's radar is very good, but to confirm what's actually happening, and for certain reports required by FEMA, they need visual reportings of actual damage, and that's what we do." FEMA is the Federal Emergency Management Agency.

The Waco radio club mans a permanent amateur radio station, installed in last January, at the National Weather Service facility at Waco Regional Airport. Before this station was installed, the club used the equipment of whatever radio operator was asked to go to the weather station, which sometimes caused delays as the operator fetched his equipment. Lovett says, "Quite often the connections were different, and we had a variety of different types of equipment..."

The radio operator on duty calls other radio operators who go to pre-established sites to watch and report on the weather. Up to 45 amateur radio operators participate. The hams also work closely with the Waco-McLellan County Office of Emergency Management. *TNX AP and R.A. Matias.*

RV Radio Net

The Good Sam RV Radio Net, covering most states and Canada, handles traffic for RVers on trips. The 400 members, who also belong to the National Good Sam Club, discuss RV problems and activities.

The net meets Monday through Friday at 10:00 a.m. EST on 7292 during the winter, and at 10:00 p.m. during the summer. You can check in up to 20 minutes before the hour. The net also meets on Tuesdays at 8:00 or 8:15 p.m. EST on about 3888.8, and Sundays on 14.240 at 3 p.m. EST.

Anyone interested is welcome to check in. For more information, send an SASE business size envelope to Jack Russell KG5IO, PO Box 207, Golden TX 75444. *TNX B-N-T Bulletin.*

Ham Help Survey

Thanks to all of you who responded to the "Ham Help" survey. Last December 1989, letters were sent to all the people who had had an entry in "Ham Help" during the previous eight months. The enthusiastic, often warm, responses we received reassure us that "Ham Help" is a valuable service for the ham community.

Of the 80+ people queried, only four reported no results. The rest received the help they needed, and some got more than they'd expected, such as new friendships, or reunions with old friends they hadn't seen for years.

"Ham Help" is staying in *73*!

TNX...

We appreciate your letters, newsletters, and calls. You can also reach us on CompuServe ppn 70310, 775, MCI Mail "WGEPUB," GEnie "MAG73," and the *73* BBS at (603) 525–4438, (300, 1200, 2400 baud) 8 data bits, no parity, one stop bit.

MFJ's *Deluxe* 300 Watt Tuners

. . . gives you ham radio's most popular tuner with *built-in dummy load,* a *peak* reading (and average) Cross-Needle meter, *full* 1.8-30 MHz coverage, antenna switch, balun and a full one-year *unconditional* guarantee for only . . . $149.95

MFJ-949D

$149.95

- ***Peak reading meter***
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- ***Covers 1.8 to 30 MHz***
- ***1 year guarantee***

You won't find all the MFJ-949D features in *any* other 300 watt tuner, not even at twice the price — or twice the size.

Put the most power into your antenna

The MFJ-949D Deluxe 300 watt tuner matches your rig to virtually any antenna from 1.8-30 MHz so you get maximum power out.

It tunes out SWR on verticals, dipoles, inverted vees, random wires, beams and mobile whips fed by coax, balanced lines and wire.

Lighted peak reading meter

MFJ's *peak* (and average) reading Cross-Needle meter shows you SWR, forward and reflected power — all in a glance. Shows peak SSB power.

The meter is illuminated for easy reading in dim light. Has light switch. Lamp requires 12 V.

Built-in dummy load

A built-in 300 watt 50 ohm dummy load makes tuning up your rig soooo easy. It reduces needless QRM and saves your finals.

You'll find it handy for testing and repairing your rig, setting power level, adjusting your mike gain and more.

An external dummy load can cost you ***another $30*** — plus it takes up valuable space at your operating position and requires another cable.

Full 1.8 to 30 MHz coverage

Make sure the tuner you're considering covers *all* the HF bands . . . the MFJ-949D does.

Plus more . . .

You get an antenna switch that lets you select 2 coax lines (direct or thru tuner), random wire or balanced lines and built-in dummy load. You get a 4:1 balun for balanced lines.

Unconditional Guarantee

You get a full one year unconditional guarantee. We will repair or replace your MFJ-949D (at our option) *no matter what* for a full year.

Others may give you a 90 day limited warranty. What do you do after 90 days? Or before 90 days if they say, "Sorry, it's your fault"?

Precise control for minimum SWR

The MFJ-949D gives you more precise control for minimum SWR than any tuner that uses two tapped inductors.

Why? Because the two continuously variable capacitors in the MFJ-949D give you infinitely more positions than the limited number on two switched coils.

This gives you precise control to get minimum SWR and maximum power into your antenna.

After all, isn't that why you use a tuner?

High efficiency and a compact size

The MFJ-949D uses a single high-Q airwound coil that takes up a minimum of space without mutual coupling problems.

You get a highly efficient tuner that puts maximum power into your antenna *and* a compact 10x3x7inch size that fits right into your station.

Competing tuners using two tapped coils require a large cabinet — not just to house the coils but also to help reduce detrimental coupling between the inductors. The result? *A tuner that's **bigger** than your radio.*

Easy to tune

With the MFJ-949D once you select the correct inductance, you can turn on your transmitter and tune *both* capacitors for minimum SWR.

Tuners with *two* tapped coils make tuning clumsy, slow and tedious.

You have to turn off your transmitter *each time* you adjust either of the two inductors. Then turn it back on to readjust the capacitor and to check for acceptable SWR.

MFJ tuners — Made in the USA

You get the most tuner for your money because MFJ tuners go directly from our factory to your dealer. We're not just an importer adding profits, tariffs and import charges.

Get yours today!

Why settle for an imitation when you can own an MFJ original? Get your MFJ-949D today!

New MFJ Deluxe 300 Watt Tuner

NEW

MFJ-948

$129.95

If you don't need a dummy load but want **all** the other features of the MFJ-949D choose the new MFJ-948 for only $129.95.

The MFJ-948 features a **peak** reading **lighted** meter with a built-in lamp switch, a one year unconditional guarantee and is made in the USA.

Remember, with MFJ you're getting proven performance and reliability from the most trusted name in antenna tuners.

MFJ's 1500 Watt Tuner

MFJ-962C

$229.95

For a few extra dollars the MFJ-962C lets you use your barefoot rig now and have the capacity to add a 1.5 KW PEP linear amplifier later. It covers 1.8 to 30 MHz.

You get MFJ's new peak and average reading Cross-Needle SWR/Wattmeter.

You also get a 6-position antenna switch and a teflon wound 4:1 balun with ceramic feed-thru insulators for balanced lines. Measures just 10¾x4½x14 7/8 inches.

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Why Choose an MFJ Tuner?

Hard-earned Reputation: There's just no shortcut. *MFJ is a name you can trust* -- more hams trust MFJ tuners throughout the world than all other tuners combined.

Proven Reliabliity: *MFJ has made more tuners for more years than anyone else* -- with MFJ tuners you get a highly-developed product with proven reliability.

First Rate Performance: MFJ tuners have earned their reputation for being able to match just about anything -- *anywhere.*

One year *unconditional* guarantee: That means we will repair or replace your MFJ tuner (at our option) *no matter what* happens to it for a year.

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The Field Day Special—The "Ray Gun"

A Concentric Combo Mode B Antenna

by Jack Douglas KA5DNP

Several years ago I was invited to speak to a new local ham club, the Northwest Area Radio Society, about amateur satellite operations. This led to my joining the club, and soon our first Field Day activity was under way.

I took along the basics for operation on RS 5 and RS 7, the simplest way of earning satellite operation bonus points. After a while I heard the beacon from the best pass we were to experience, and then a beautiful "CQ Field Day" call.

At that moment, our HF CW station was changing operators. When the new operator came on I went running to ask for a 15-minute break in the CW activity, but to no avail. They simply did not understand that I had only 15 minutes to earn the bonus points and that their powerful CW signal was not kind to a high-sensitivity Mode A receiving system. Alas, no satellite operation that Field Day!

In 1988 I didn't give much thought to satellite operation at Field Day, but while I was at our site an idea hit. Maybe I could use the all-mode 2m in my car to hit RS 10/11. Then if a friend with HF in his car could pull up door-to-door with me, maybe we could make a contact. It worked! We made a good contact, but it could hardly be called a real satellite operation. Somehow we slipped this one in between CW calls from the "real" Field Day station.

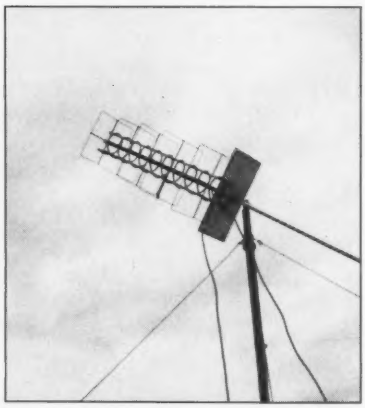

Photo A. The "Ray Gun" Mode B concentric combo antenna installed for Field Day operation. Note the string (horizontal line from the mount, lower right corner of the photo) used to adjust the elevation.

Photo B. The antenna installed at the motor home operating point.

In early spring of 1989 the club Field Day chairman called to ask if I would make a satellite effort for Field Day. I was noncommittal until a friend, Ken Edinborgh W5BKK, said we could use his radios if I could get an antenna set up.

I have operated on the high-flying birds (Oscars 10 and 13) for over five years using home-brew "Armstrong" operated antennas. Maybe I could construct a simple antenna system, thus avoiding the need for taking down someone's antenna system just for Field Day. This resulted in the "Mode B Concentric Combo," dubbed "The Ray Gun" by one of the fellows at Field Day.

What is the Ray Gun?

The Ray Gun is a 5-element 2m quad with a ten-turn 70cm helix wound inside it, concentric on an eight-foot wooden closet pole boom. The quad is an adaptation of information from the *The Satellite Experimenter's Handbook* and the 1986 *ARRL Handbook*. The helix is an adaptation of a design passed on to me by Jim McKim WØCY. (I used Jim's information to construct my home station 70cm antenna—the only 70cm antenna I have ever used!)

Photo A shows the Ray Gun in all its glory mounted at the Field Day site. (The thin horizontal line running to the right is the string used to vary elevation.) Photo B shows the antenna installed next to the motor home of Vince Hayes KCØLM, which was the operating point. Photo C shows the antenna in its "test mounting" (a rope thrown over my breezeway). We made sixteen contacts from the "test mounting" setup. Not too shabby, since elevation and azimuth weren't easy to change!

The Ray Gun is mounted on a 2″ x 2″ pole. A tie string handles elevation; azimuth changes are made by rotating the pole. With this setup our station logged 40 contacts on the Saturday night pass of AO-13, albeit with some difficulties from rains.

The advantage of the Ray Gun is that you only need to haul one antenna to Field Day, along with one small pole and some rope and tent pegs. The disadvantages are that there will be some desense because the two systems are so interlaced, and problems with wooden construction materials getting wet and reducing the efficiency of the 70cm helix. Note that I have referred to the antenna as a Mode B combo. This is because with the actual setup we had, be it antenna design or whatever, desense on Mode J was simply too great to allow operation.

I didn't have to buy anything to build this antenna—I already had everything I needed. If you want to build your own "Combo" I estimate you can buy everything for less than $50.00. An operational Mode B antenna for fifty bucks is not too common an animal!

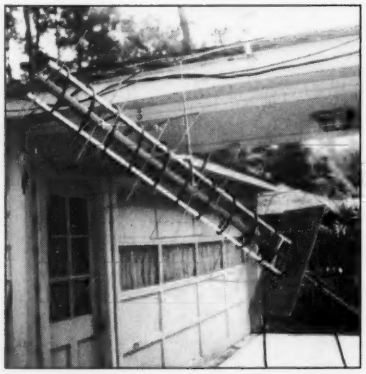

Photo C. The "Ray Gun" in its "test mounting" (a rope thrown over KA5DNP's breezeway).

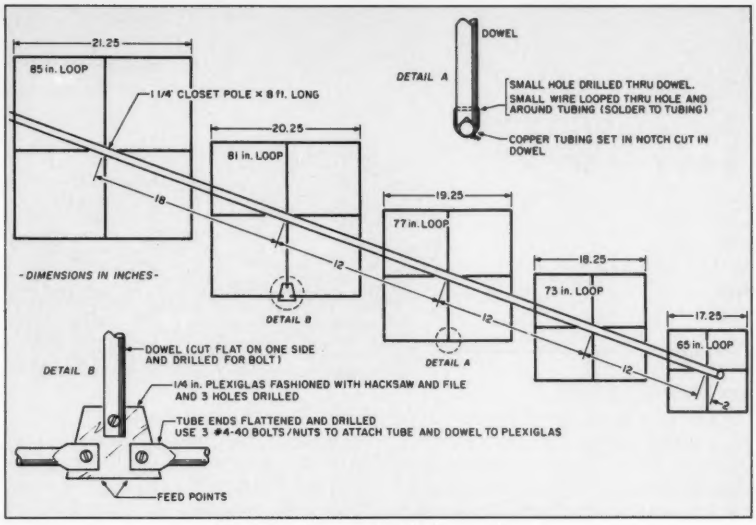

Figure 1. Constructing the 2 meter beam.

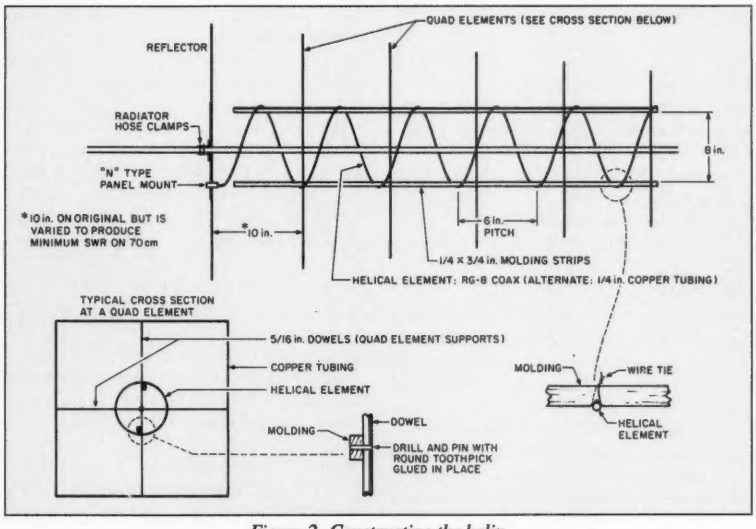
QUAD ELEMENTS (SEE CROSS SECTION BELOW)
REFLECTOR
RADIATOR HOSE CLAMPS
"N" TYPE PANEL MOUNT
8 in.
*10 in. ON ORIGINAL BUT IS VARIED TO PRODUCE MINIMUM SWR ON 70 cm
*10 in.
6 in. PITCH
1/4 x 3/4 in. MOLDING STRIPS
HELICAL ELEMENT: RG-8 COAX (ALTERNATE: 1/4 in. COPPER TUBING)
TYPICAL CROSS SECTION AT A QUAD ELEMENT
5/16 in. DOWELS (QUAD ELEMENT SUPPORTS)
COPPER TUBING
HELICAL ELEMENT
MOLDING
DOWEL
DRILL AND PIN WITH ROUND TOOTHPICK GLUED IN PLACE
MOLDING
WIRE TIE
HELICAL ELEMENT

Figure 2. Constructing the helix.

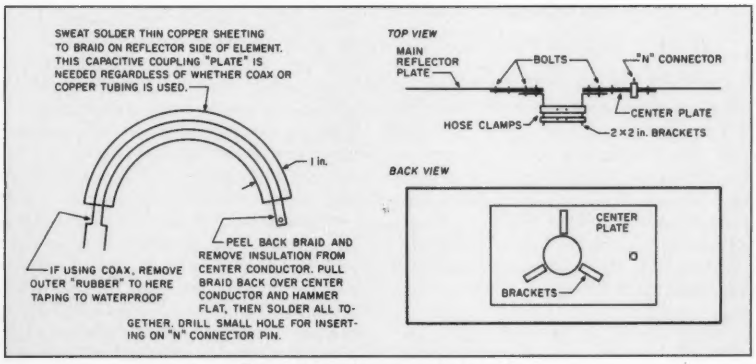
SWEAT SOLDER THIN COPPER SHEETING TO BRAID ON REFLECTOR SIDE OF ELEMENT. THIS CAPACITIVE COUPLING "PLATE" IS NEEDED REGARDLESS OF WHETHER COAX OR COPPER TUBING IS USED.
1 in.
IF USING COAX, REMOVE OUTER "RUBBER" TO HERE TAPING TO WATERPROOF
PEEL BACK BRAID AND REMOVE INSULATION FROM CENTER CONDUCTOR. PULL BRAID BACK OVER CENTER CONDUCTOR AND HAMMER FLAT, THEN SOLDER ALL TOGETHER. DRILL SMALL HOLE FOR INSERTING ON "N" CONNECTOR PIN.
TOP VIEW
MAIN REFLECTOR PLATE
BOLTS
"N" CONNECTOR
CENTER PLATE
HOSE CLAMPS
2 x 2 in. BRACKETS
BACK VIEW
CENTER PLATE
BRACKETS

Figure 3. Final construction details.

Construction Details

I began by constructing the 2m beam (see Figure 1). The central boom is a 1 ¼" wooden closet pole eight feet long. (You can use less but it's nice to have plenty to work with.) The elements are squares made from 3/16" copper tubing (the tubing size is not critical). The element supports are made from 5/16" dowels. (Again, their diameter is not critical.) The insulator on the driven element was fashioned from a piece of plexiglas. The elements are connected to the dowel supports by the system Jim McKim WØCY used in his helix. (See Figure 1 for details.) The dowel supports are mounted to the "boom" by drilling 11/32" holes ½" deep in the boom. Fill the holes with fresh carpenter's glue and force the dowels into place.

The elements are not mechanically strong. I found it helpful and practical during construction to suspend the boom on small ropes thrown over the ceiling joists of my garage. The finished antenna is held up by a fitting on the boom. The mechanical integrity is more than adequate when supported in this manner.

The key element of the helix (Figure 2) is the reflector. The exact overall dimensions are not critical. To quote WØCY: "The helix is about the most tolerance-forgiving of any antenna." He used a 30" diameter circular reflector; I used a 24" x 30" rectangular reflector on my home base and a 14" x 27" rectangle on the Ray Gun because that is what I had on hand. However, I suggest you use something at least 24" x 24". A good source material is the design-punched aluminum sheets sold by most do-it-yourself stores for kick panels for screen doors. However, they are thin and you will have to brace them by bolting on flat metal or small angle iron strips, also available at local stores. The center area piece must be stronger. It can be made from an old aluminum rack panel or something similar. It should be 9" x 9", or a 10" circle (not critical as long as it is big enough to mount the 4" offset feedpoint). Bolt it to the larger reflector plate.

Refer to Figure 3 for the construction details of the next steps. Drill or cut a hole in the center large enough to allow the boom to pass through. (I suggest 1-5/16".) Place a second hole, to accommodate a panel mount "N" connector, 4" off center. Attach three 2" x 2" right angle brackets to the reflector at the edges of the center hole (at 120 degree angles). This can be done by drilling and bolting, using 6-32 bolts. The idea is to have the brackets placed so that when the boom is run through the center hole it can be secured by radiator hose clamps tightened around the brackets. Later you can "match" the antenna by varying the capacitive coupling between the first half turn of the helix and the reflector screen. The sweat-soldered copper on the first half turn facilitates this procedure.

When the reflector assembly is ready, set it aside and mount the helical element. Run strips of ¾" by ¼" molding parallel to the boom, with their outside edges 8" apart. (See Figure 2.) Lay them against the quad support dowels and hold them in place with C clamps. Use a small drill, sized to fit toothpicks, to drill holes through the molding and the dowels. Pin the molding in place by putting round toothpicks through the holes and gluing the toothpicks in place. Cut small notches in the outer edge of each molding at 6" intervals, offsetting notches on one molding 3" from

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73 Review *by David A. Manson N1CTI*

Pyramid Phase III PS-25

Adjustable power supply.

This summer I was finally able to retire my tube rig and buy a clean, used ICOM IC-735, but limited funds precluded buying a matching power supply. So out came a recent copy of *73 Magazine* to check out the alternatives.

The supply I chose and the subject of this review is the Pyramid Phase III adjustable regulated power supply, model no. PS-25. I have also seen this supply under the Tenna brand name. The PS-25 was purchased for around $90, including shipping, and comes with a two-year warranty.

This supply, rated at 25 amps continuous and 27 surge over a range of 10 to 15 VDC, has separate front panel meters to display current and voltage. The ON/OFF switch doubles as the power ON indicator, and it goes out if the built-in protection circuitry detects an overload and shuts down the supply.

Straightforward Design

Set-up is quite simple. I used the mobile cable supplied with my radio to connect the supply to the rig. The combination binding posts and banana jacks on the front panel can be unscrewed completely to allow the ring connectors on the cable to be used without modification. After turning the supply on you can adjust the voltage as desired with the front panel control.

Initially I had some concerns that the voltage control might be inadvertently bumped, but the rack-type handles on the front of the supply protect both the ON/OFF switch and the voltage control.

The supply is enclosed in a metal enclosure measuring 9"W x 5"H x 12"D with black matte finish. All controls are located on the front panel, including the fuse holder. The quality of construction is quite excellent, and a schematic was included with the supply. The circuitry uses an integrated regulator chip with standard RCA 2N3055 NPN pass transistors.

The pass transistors are mounted on two large heat sinks on the rear of the cabinet, and have never been more than warm to the touch even after extended high current load (100 watts FM).

Due to the quality of construction, two-year warranty, and the discount price, this could be the best power supply buy of the year. I highly recommend it for the amateur on a tight budget. It is also excellent as a variable power supply for the test bench. *The PS-25 is available from National Tower Company, PO Box 15417, Shawnee Mission KS 66215. Phone: (913) 888-8864.* 73

Field Day Special, *continued from p. 11.*

those on the other molding. Just below the vertex of each notch, drill a very small hole to use for a wire tie.

Varnish all of the wood to waterproof it. When the varnish has dried, wind in your element, fitting it in the notches and tying it with wire ties to hold it in place. The windings should be clockwise when viewed from the back end, where the reflector of the quad is located. (This is where you will mount the helix reflector.) Leave both ends of the element long enough to allow room for forming end fittings.

If you're using coax, remove the outer insulation from the back end of the helical element. (See Figure 3.) Whatever is used for the element, sweat on a 1" x 6" arc-shaped copper plate (made from tooling copper or any kind of thin copper sheeting). Flatten the end (being sure the braid and center conductor are in electrical contact if you are using coax) and firm it with solder. Drill a small hole just large enough so that it can be slipped over the soldering tip of a panel-mount "N" connector. The outer end of the element should be cut off just past the last tie so that it is stable. If you are using coax, connect the braid to the center conductor and waterproof the end with tape and coax seal.

Now slide the reflector onto the boom and up to the point where the end of the element can be soldered to the "N" connector. Push it forward enough so that the first half turn (the one with the copper plate on it) is very close (about ½" to ¾") to the reflector . Slip two hose clamps on the reflector.

The Match

If you have the antenna suspended on ropes, and it is not too close to other objects, you can now test the match. The dimensions control the match on the quad. The actual match is not critical for Mode B because you will not use the antenna for transmission, but try for a good one because you might want to use your Ray Gun on Mode J.

"The advantage of the Ray Gun is that you only need to haul one antenna to Field Day."

To match the helix, slide the reflector back and forth (closing and opening the gap between it and the first half turn of the element) until you get a match. It should be easy to get ratios below 1.1:1. When you have a match, tighten the hose clamps so the reflector cannot move. The antenna is now complete, but you still need to do some more work before you mount it.

Get six feet of 1¼" ID metallic EMT pipe. Depending on the actual finish on your boom, the EMT will slide over the back end or you may have to sand the boom down slightly. When it does fit over the boom, slide it up against the ends of the brackets holding the reflector. With the antenna suspended so that the feedpoint of the quad is on the bottom, drill a ¼" hole through the EMT and the boom, parallel to the ground and about six inches back from the front edge of the EMT pipe. Rotate the antenna 90 degrees and drill another hole two inches back from the first. A bolt through either of these holes will suspend the antenna. The hole you use will depend on which orientation seems to work best for you.

A wooden pole 2" x 2" 8–12 feet long can serve as the mounting pole. You will need a piece of 2" ID very heavy duty PVC about four inches long. By cutting the corners off the pole on one end for a distance of about a foot, you should be able to slide the PVC over it as a collar. It should shoulder at the end of the length where the corners of the pole have been cut. Three holes in the collar at 120 degree angles, fitted with small eye bolts, will provide places to tie on three pieces of light rope or heavy nylon cord. These can be run to tent pegs to hold the pole up, yet the pole can still be rotated to change azimuth. A hole through the top of the pole and a bolt long enough to go through the mounting holes on the antenna and the pole provide a single point mount for the antenna. The EMT should be cut off as necessary so that the front of the antenna will drop down when the antenna is suspended on the single bolt. Drilling a small hole in the back end of the EMT and running a nylon cord through this hole to a tent peg will provide a means of setting elevation.

Now you have a Ray Gun concentric Mode B antenna! 73

Contact Jack Douglas KA5DNP at 2019 Willow Point Drive, Kingwood TX 77339.

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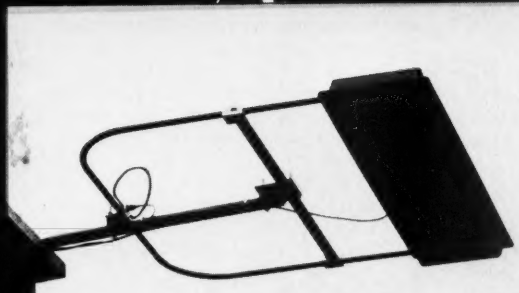
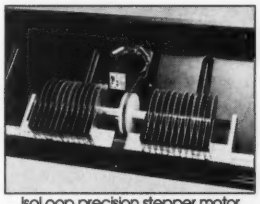
150 Watts. Rated up to 150 watts, the IsoLoop transmits and receives on any frequency between 14 to 30 MHz. When mounted with the loop in the horizontal plane, the radiation pattern is omni-directional and horizontally polarized, with the gain of a dipole. Maximum radiation is at low angles which is ideal for DX operation. The IsoLoop may also be mounted with the loop in the vertical plane to provide a null in a desired direction. Tuning is provided by a precision stepper-motor and a small remote control box, the LC-1.

The IsoLoop does not need ground radials and its balanced, shielded feed-loop isolates the feedline from the antenna. The IsoLoop is well-isolated from the feedline. Like AEA's Isopole antennas, your signal is radiated by the antenna and not the feedline. With end-fed antennas, the outside of the coax becomes part of the antenna, resulting in noise and computer hash pickup and increased TVI problems.

High-Q Design. One of the unique features of the IsoLoop is its inherent High-Q. The IsoLoop can be considered a very sharp tunable filter that radiates. The narrow bandwidth suppresses harmonics from your transmitter reducing TVI problems. It also attenuates out-of-band signals from nearby transmitters that could overload your receiver.



Compact. The IsoLoop is square, with rounded corners, and measures 32 inches on a side and weighs only 12 pounds. Because of the IsoLoop's small size, it makes a perfect attic or balcony antenna. It's also excellent for portable operation, recreational vehicles or camp-site use. A rotator is not necessary when used in the omni-directional, horizontally polarized mode.



IsoLoop precision stepper motor provides accurate tuning.

IsoLoop LC-1 control box with variable speed tuning.

Revolutionary. The AEA IsoLoop antenna represents years of research and development. Others may try to imitate the IsoLoop, but none can match the patent-pending design.

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TNC Connect Alarm

Did anyone call while I was out?

by Mark Schmidt DA1AU/WB9EGA

Packet has brought hundreds of hams back into the fold of activity. We can pass emergency services traffic faster than we can generate it (try that with CW). Entire packet stations can fit inside a briefcase and be set up in minutes. For me, this mode was a way I could indulge in my two vices—computer and radio—simultaneously. I'm having a ball! 99.9% of my operation is packet.

The Problem

Like most stations, mine is in one room, and I didn't want to spend my free time sitting in front of the computer waiting for someone to call. I needed something which would signal me when someone connected. The TNC's "ring"(*) parameter sends three bells on a connect, but what if I wasn't around to hear it?

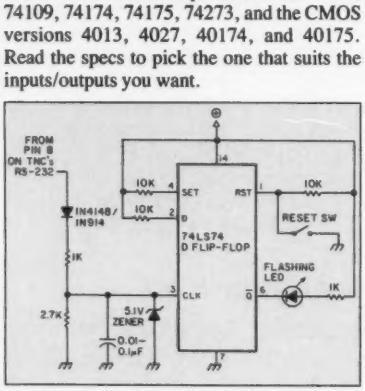
An Idea is Born

Browsing through the KPC-2 TNC manual in the section about the RS-232 port, I found on line 8, the Data Carrier Detect, that "when connections exist, the line will be true." Rereading it, I eventually saw the makings of a hardware connect alarm.

If unconnected, the line will be false (a minus voltage). If I connect to someone, or someone connects to me, it will be true (a positive voltage). When I or they disconnect, it goes false again. Armed with these facts, there are three things this hardware connect alarm will have to do for me: detect the transition from false to true, give me a signal if the status is true, and save the true status until I reset it.

The Answer

You can do it all with a single flip-flop. It must be positive edge triggered with an asynchronous reset. Although I haven't tried them all, several fit this requirement: the 7474, 74109, 74174, 74175, 74273, and the CMOS versions 4013, 4027, 40174, and 40175. Read the specs to pick the one that suits the inputs/outputs you want.



Schematic of the TNC connect alarm.

I chose the 74LS74 (low power Schottky version) D Flip-Flop. Construction details are based on the 7474. Although the 7474 contains two flip-flops, you need only one. If you find a use for the other one, let me know. The circuit I came up with is simple. The whole thing is very small; you can build it on a PC board 1½" square. You'll need +5 volts to power the 7474, but you don't have to add a battery. You can pick it off from the TNC's regulator.

RS-232/TTL Level Conversion

RS-232 signal levels can vary anywhere between −3 and −25 for false and +3 to +25 for true, so you need to convert the negative voltage to 0 and the positive to +5, the allowable limits of the 74xx TTL series. The diode on pin 8 takes care of the negative voltage and the 5.1 volt zener diode takes care of the positive voltage. Think of them as protection for the 7474.

Any negative voltage at the RS-232's pin 8 results in 0 voltage at pin 3 of the 7474, and any positive voltage greater than 5 volts is held to +5 volts. The Set and Reset pins are held high, as is the D input. When a connect occurs, the negative to positive transition at pin 8 of the RS-232 will convert to a 0 to 5 volt clocking pulse for the 7474. At that time, whatever is on the D input (a high) will appear at the Q output. Also the opposite (a low) will be at the ≠Q output. It will stay that way until the Reset (pin 1) is momentarily brought low. What could be easier?

The Signaling Device

Choose whatever you want for the signaling device. It can be visual, like a simple LED or even a strobe light, or something audible, like a buzzer, horn, or siren. Why not go remote and integrate it into a short range pager like I saw in the May 1986 issue of *73*. It's up to you. You are limited only by your imagination.

The Q and ≠Q outputs are low power, so if you intend to use a large device, use a relay.

Mounting

This unit is very small and easily fits inside the TNC. There's room on the faceplate to mount an LED and a reset switch. Tap into pin 8 from the inside.

Now maybe for some reason, you don't want to mount it inside the case. You're going to use a strobe light and siren, and you might as well mount the board someplace else. In that case, the +5 volts for the 7474 will have to be routed externally to wherever your board will be. While you have the TNC open, take a look at the RS-232 jack. You will see that many of the pins are unconnected. Solder a wire from the output on the 7805 regulator to an unused pin on the jack. I used pin 13. Now you have everything you need available at the jack: ground (pin 7), +5 volts (pin 13), and the status (pin 8).

CMOS Considerations

Although I have not yet made a CMOS version, there are a few things you should keep in mind. Since CMOS can operate at higher voltages than the 5 volt TTLs, you may want to use 12 volts to power the chip. It just so happens that 12 volts is already on pin 25 of the KPC-2. You don't have to reroute power to the RS-232 jack. Also, you may not need the 5.1 volt zener. Experiment and see.

Operation

Using this couldn't be simpler. When someone connects to you, or you connect to them, the alarm will be activated and stay that way until you reset it. But if you're running multiple streams, there's something you should be aware of. Let's say you're connected on stream A and not on stream B. If you are on stream A and change to stream B, you will change from a connected to an unconnected state; when you change back to stream A, what happens? You guessed it. The alarm will activate. It doesn't distinguish streams—it sees just a simple unconnected to connected state change. Other than this little quirk, which we can do nothing about, it works as advertised.

Parts cost me nothing since I had all the parts in stock, but everything new shouldn't cost more than $3 (excluding strobe and siren) and all are available from Radio Shack.

Four out of Four

This project uses common and cheap parts (two of the four requirements for any of my projects). Construction is fast and simple (the other two requirements). It'll give your packet operations a little something extra.

Packet is the best thing to happen to amateur radio in a long time. We're doing things unheard of on any other mode. Let's use it wisely, but most of all . . . enjoy! 73

Mark T. Schmidt DA1AU/WB9EGA, Box 1001, APO NY 09104. He writes, "Here in Germany, no-code is alive and well . . . CW is a mode, not THE mode."

Parts List

1	74LS74 D Flip-Flop	1	2.7k resistor
1	5.1 volt zener diode	1	0.1–0.01 μF capacitor
1	1N914/4148 diode	1	flashing LED
2	1k resistors	1	SPST switch
3	10k resistors		

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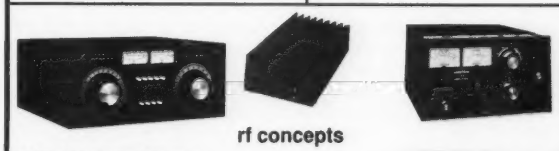

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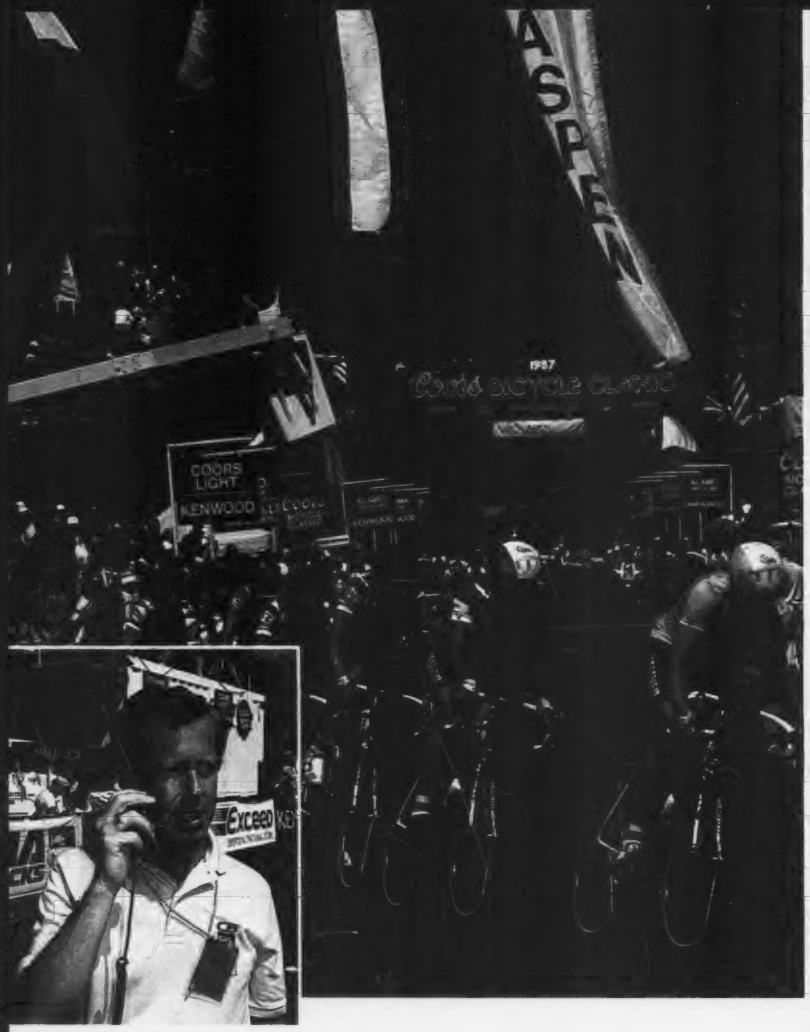

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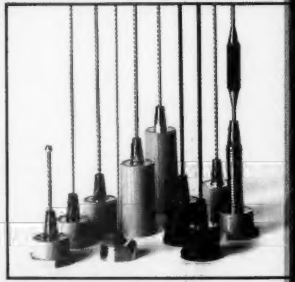

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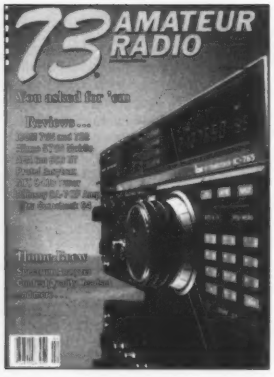

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6/90S

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In our continuing effort to present the best in amateur radio features and columns, we recognize the need to go directly to the source—you, the reader. Articles and columns are assigned feedback numbers, which appear on each article/column and are also listed here. These numbers correspond to those on the feedback card opposite this page. On the card, please check the box which honestly represents your opinion of each article or column.

Do we really read the feedback cards? You bet! The results are tabulated each month, and the editors take a good, hard look at what you do and don't like. To show our appreciation, we draw one feedback card each month and award the lucky winner a free one-year subscription (or extension) to *73*.

To save on postage, why not fill out the Product Report card and the Feedback card and put them in an envelope? Toss in a damning or praising letter to the editor while you're at it. You can also enter your QSL in our QSL of the Month contest. All for the low, low price of 25 cents!

Feedback #	Title
1	Letters
2	Never Say Die
3	QRX
4	Field Day Special
5	Pyramid Phase III PS-25
6	Ham Profiles
7	COSIN Network
8	FCC Study Diskettes
9	Big But Cheap
10	Two Meter Portable Quad
11	PC HF Facsimile 4.0
12	Radio Journal 1912–1940
13	Tune In VLF
14	Circuits
15	Experimental Gaussmeter
16	Standard Magnetic Field Generator
17	Looking West
18	Ham Help
19	ICOM Service Survey
20	Backward Inverted L Antenna
21	Packet Talk
22	Homing In
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24	Pipo Communications DTMF Pad
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36	Tech Tips
37	QRP
38	Special Events
39	ATV
40	DX
41	de K6MH
42	Propagation
43	The Cuckoo's Egg
44	TNC Connect Alarm
45	Be A Ham?

HAM PROFILES

There are no "average" hams!

Photo A. Sixteen-year-old Aaron Greiner KBØBDY stands between his father, Keith AKØQ, and his grandfather, Loren Greiner WØGTW.

Third Generation Ham

When still a child, Aaron Greiner KBØBDY began participating in amateur radio by watching his father. Eventually, the code "rubbed off" on him. The code test was easy, and with only a little study Aaron did well on the written test.

Says Aaron, "I love to get on the air and try for DX contacts using CW. One reason why I love to use CW so much is that I can tell my Spanish teacher that I really don't need to know Spanish to talk to someone in Spain because I almost always use CW instead of voice.

"I am currently a sophomore at Dowling High School in Des Moines, Iowa, and I'm very active on the soccer team. I'm also learning to fly remote controlled airplanes, and I carry a newspaper route for the *Des Moines Register*."

On his 16th birthday in January 1990, Aaron became the third generation of the Greiner family to achieve the General Class license. Aaron's grandfather, Loren, was the first Greiner to become a ham. He received his General Class license in 1947. Now he holds an Advanced Class license with the call WØGTW. Aaron's father, Keith AKØQ, has had an Extra Class license since 1984. He was first licensed in 1962 as a General Class operator.

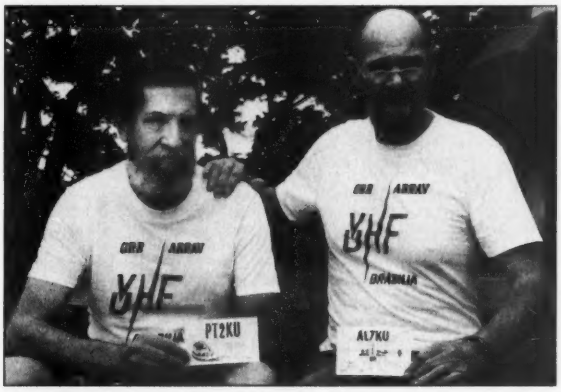

Photo C. Gilbert Monroe AL7KU (right) of Fairbanks, Alaska, has an eyeball QSO with Joel Pinto PT2KU (left) of Brazil, at the latter's QTH. Sr. Pinto designed the T-shirts for the first 2m group in Brazil.

Goldmine of Ham Experience

Gilbert Monroe AL7KU, known to friends as "Gil," first became interested in radio in 1930 at the age of eight. His brother and a friend built a spark-gap transmitter out of a Ford Model T ignition coil. They used a "kitty-whisker" and galena crystal with the tuning coil wrapped on a round Quaker Oats box for the receiver. It transmitted about five blocks. Gil was deeply impressed, but ". . . it was 21 years later that I finally managed to get the code down well enought to get a ham ticket (13 wpm)."

AL7KU was first licensed in 1951 in Fairbanks, Alaska. At that time he worked for the Geophysical Institute at the University of Alaska doing research on radio propagation. He supervised a group who developed a wave-tilt method of determining earth resistivity. For many years now, Gil AL7KU has been a gold miner.

His major interest in ham radio is DXing, and his top enjoyment is eyeball QSOs with foreign hams. Each year he takes a three-month vacation to Central or South America. He has learned to speak Spanish very well.

Last February, Gil traveled to Brazil to meet Joel Pinto PT2KU, who was first licensed in 1949. In 1975 PT2KU set up the first 2m station in Brazil. AL7KU and PT2KU enjoyed reliving ham operations from the old crystal-controlled 6L6-807 rigs up through their present day computer setups. Gil AL7KU visited the LABRE QSL bureau in Brasilia and was able to hand-carry a three-inch stack of cards to the QSL manager in Anchorage, Alaska. Next winter, Gil will head for VK-land.

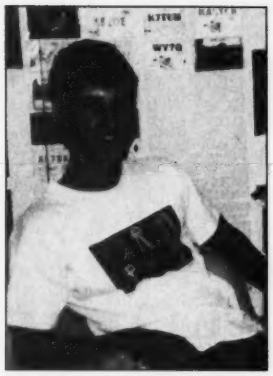

Photo B. In addition to ham radio, Todd Tittle KF7LX enjoys fishing, horseback riding, waterskiing, and photography.

A Capable Ham

When Todd Tittle KF7LX was 14, he earned his Novice license, and within a year he had achieved his Advanced Class license. Tod's favorite part of ham radio is meeting new people.

Todd is another third-generation ham. His grandfather, W.C. Brown, Sr. W6ECO, would be delighted to see his great grandson's enthusiasm for the hobby. Bill, Jr. W6TAO, Todd's grandfather, has been active in amateur radio for the past 38 years.

Last July KF7LX was elected secretary/treasurer of the Western Country Cousin's net. At 15 years-old, he was the youngest of the 1838 members. (The election was close, and according to "Lee" Dedrickson WB7EZI who submitted this material, ". . . there were many unfavorable comments made by the losers who thought a person had to be on the verge of senility to handle the job. One such comment was, 'I don't trust young people.' Our answer to that was, 'Maybe we had better parents than them.' ") Seven months later, Todd had proved himself capable of an outstanding job.

Todd is also the Treasurer of the CUBS Amateur Radio Society of Sedro-Woolley High School. He and his fellow CUB members have placed first and second in the summer Field Day competition among Educational Clubs Class 1A (which includes high schools and colleges).

In his "spare" time, Todd maintains high scholastic standards, and enjoys fishing, horseback riding, waterskiing, and photography. He is a certified scuba diver.

(Lee WB7EZI would like to give this message to the old-timers: "Welcome and encourage the young people, or your nets will be as dead as you are already acting.")

COSIN: The COmputer Student Information Network

High school credits for ham radio.

by Jozef Hand-Boniakowski WB2MIC

We've been hearing a lot of talk about the demise of ham radio and rejuvenating our ranks, but we don't hear enough about the accomplishments of amateur radio operators in this area.

Five years ago I escaped from the grind of living in New Jersey, moved to the Green Mountains of Vermont, and began working for Burr & Burton Seminary, a private nonsectarian high school in Manchester, Vermont. I already had 12 years' experience running a public school radio club, with 12-year-olds getting their Novice licenses and 15-year-olds getting their Extras.

I sold my ham radio background and 22 years in amateur radio to the Burr & Burton administration as an asset that would enhance education. I called the press and a few articles appeared in the local papers.

The administration agreed to list the course as "Introduction to Electromagnetic Theory" in the school catalog, making certain that it was specified as amateur radio—a passport to travel, excitement, and friendly people—and clearly stated that students would earn credits toward graduation. The course would be open to everyone, with no prerequisites and no possibility of failure.

Luring Them

At the weekly Monday morning assembly at the school, I gave a short talk to the student body about one student's (Peter KA1RMN, now DL8KBQ) success at getting his Novice ham license. Then, having arranged for Ed Bort KT1Q to stand by his 2m rig, I pulled out my ICOM IC-32AT, held it up close to the microphone, and called him. He congratulated Peter over the air, via repeater, with an audience of 317 students, faculty, and guests watching! Talk about making an impression! (Fair warning: Test the public-address system beforehand. Nothing can be worse than RF causing problems with the PA.)

On another occasion, I recorded a dozen QSOs from stations that I had worked on HF. I made certain that these stations were spaced around the globe as far as possible. I asked each of the strongest QRM-free stations to pass along slowly, with good enunciation, a greeting to the school and a one-line description of the station's location and the transmitting ham's name.

Rob Putis KA1URY, Paul Donahue KA1URX and computer science teacher Jozef Hand-Boniakowski WB2MIC broadcast over the Burr & Burton Seminary's ham radio setup.

You can imagine the results! Chins dropped. Each student felt as if the hams in far-off places were talking directly to them. Then I described ham radio and how simple it was to get a special transmitting license to talk back. I built up the prospects of having a ham ticket as an asset, useful when applying for college or for jobs after graduation. That the applicant, in his or her spare time, studied for and obtained an FCC Amateur Radio License is impressive!

Catching Them

Most schools have a high-traffic area with bulletin boards. I took 40 QSL cards from different countries and made an attractive display, challenging the students to match the card with the country names below. This display passed along the excitement of talking with people in far-off places. Many students learned about rare DX places such as Bouvet, the Seychelles, St. Pierre, etc., that they'd never heard about before.

During the joint Soviet-Canadian Ski-Trek over the North Pole in 1988, I made 44 copies of the packet messages that arrived at the WB2MIC COSIN (COmputer Student Information Network) BBS, tracking the team's progress. I gave a copy to each teacher, administrator and staff member. I included magazine articles describing the expedition, AMSAT packet messages, and suggested school activities. I let everyone know that there was a ham radio satellite, OSCAR-10, up there with a digitalker on board that they could listen to with a handheld or scanner. I arranged to be on hand to visit any classroom that wanted me and my HT.

Reeling Them In

I teach Computer Science, Science 9, and General Math. The school's ham shack is located in my computer room. There are eight IBM Model 25s, one tied into an AEA PK-232 multimode controller. The HF radio is always available during homeroom period, between classes, or after a programming assignment has been completed. There is also an R2000 general coverage shortwave radio. "Listen for yourself to Glasnost," I challenged them. "Do you have a report to do on current events or contemporary problems? Tune into the 'Voice of that Country' and roll the tape recorder." During Mission 32 of the Space Shuttle *Columbia*, the R2000 was running full-time in the background, copying WA3NAN from the Goddard Spaceflight Center. Dozens were exposed to communications, SWLing and ham radio daily during the duration.

I let the social studies teachers know that all this is at their disposal. At the hamfests I look for used equipment, such as old Hallicrafters or Nationals, and sell them to the teachers at cost.

The most luck I have with ham radio in the classroom is with packet radio. COSIN was five years in the making. It consists of a BBS located at my home QTH in Wells, Vermont, a digipeater located atop Northeast Mountain to cover most of eastern New York and west Vermont, and a desire to make packet radio the new "pen pal" medium. On behalf of any student, an amateur may send a packet message all over the region or the country. We do this quite often, as messages addressed to "ALL@ALLBBS." Some students are interested in corresponding with other kids in a foreign language, others are seeking out Holocaust

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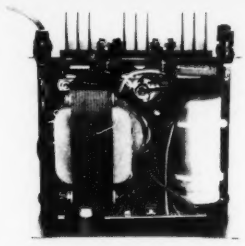

INSIDE VIEW — RS-12A

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- RIPPLE Less than 5mv peak to peak (full load & low line)
- **Also available with 220 VAC input voltage**

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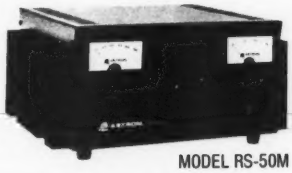
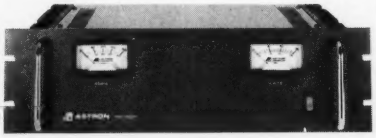


MODEL RS-50M

MODEL VS-50M

RM SERIES



MODEL RM-35M

19″ × 5¼ RACK MOUNT POWER SUPPLIES

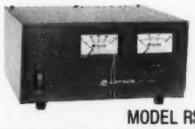
MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50

RS-A SERIES

MODEL RS-7A

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A	2.5	3	3 × 4¾ × 5¾	4
RS-4A	3	4	3¾ × 6½ × 9	5
RS-5A	4	5	3½ × 6⅛ × 7¼	7
RS-7A	5	7	3¾ × 6½ × 9	9
RS-7B	5	7	4 × 7½ × 10¾	10
RS-10A	7.5	10	4 × 7½ × 10¾	11
RS-12A	9	12	4½ × 8 × 9	13
RS-12B	9	12	4 × 7½ × 10¾	13
RS-20A	16	20	5 × 9 × 10½	18
RS-35A	25	35	5 × 11 × 11	27
RS-50A	37	50	6 × 13¾ × 11	46

RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46

VS-M AND VRM-M SERIES

MODEL VS-35M

• Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES

MODEL RS-12S

• Built in speaker

MODEL	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	5	7	4 × 7½ × 10¾	10
RS-10S	7.5	10	4 × 7½ × 10¾	12
RS-12S	9	12	4½ × 8 × 9	13
RS-20S	16	20	5 × 9 × 10½	18

*ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

CIRCLE 16 ON READER SERVICE CARD

survivors, and some just want to reach out to others.

Through packet BBS I met Brian Riley KA2BQE, author of the impressive PRMBS (Packet Radio Mailbox System) ROSERVER. (I highly recommend this software if you want to run a BBS, especially if you wish to use it in a school.) Brian's original message, "Where have all the brains gone," caught our attention. I opened access to the BBS for the student body so that they could meet Brian via packet.

Brian is a Vietnam Marine Corps veteran, wounded in action. His stubbornness and a lot of luck accounts for him being alive today. Brian asked if students would be interested in interviewing him about his prewar, combat, and postwar experiences. Many have taken the opportunity. Ham radio via packet offered the youngsters the opportunity to preplan their questions and ask them anonymously (if they choose to) in non-real-time, without apprehension.

Carrying the Torch

As hams and educators, it's our responsibility to take the initiative and make inroads to and with our youth. Excitement rubs off. So do apathy and boredom. There are dozens and dozens of ways to express our excitement over our hobby to young people. We have to be creative in our approach. I have barely begun to mention the possibilities. Some other ideas I have tried or contemplated include: a suitcase packet station that travels with the environmental studies class (relaying data for computer analysis back to kids in the classroom), a statewide (or nationwide) on-the-air chess tournament via ham FS and SSTV, and a model rocket club using ham radio for coverage the way Walter Cronkite did it in his best days. Incidentally, Walter is now a ham!

The ARRL has recently renovated the W1AW club station, purchasing Harris commercial equipment. Instead of spending thousands of dollars for such an extravaganza, the League would have been better off equipping a few vans with roving ham gear. They could have hired teachers for full-time travel, like NASA does, to hit the road and give daily assembly presentations during the school year. Imagine hamming all day! Teaching! Traveling! The assembly presentation would have quick-setup OSCAR-13 ground stations, FS/SSTV and impressive Tesla coil demonstrations, spark-gap transmitters, etc. You could even string a dipole for 10 meters and bring out a small portable exercycle with a volunteer pedaling to produce 12 VDC for a Uniden HR-2510 and another volunteer QSOing at the mike.

My next project is to get a 220 MHz novice repeater on the air for use by students and adult hams interested in talking with students, learning new topics, discussing new ideas, debating contemporary issues, etc. I have approached the local business community for funding, mentioning that ham radio with student participation will "offer" the community a "service" by the installation of the repeater. I then ask if they are interested in helping fund the project in return for services rendered. (To those of you who object by saying that this is "business," I say "bull feathers." It's no different from a club newsletter asking for funds to help finance a repeater.) So far, most of the contributions have come from non-ham sources. The hams are still saying: "Can't do."

Think about the educational uses of a repeater. Teachers could have ham radio coverage of their classes for those who want to return to school! How about a question-and-answer session between the governor and a social studies class on a wide area coverage repeater, or a weekly net session by a retired person who is knowledgeable on a particular topic? Approach your local school with such prospects. You'll be surprised at how receptive the administration is and how successful you can be.

Ham radio is a way of life for me. As are kids and education—the two are best of friends. With a little effort the hobby can grow and the US will see a new pool of engineers and scientists who are excited about future technological prospects. It is up to us, the nonmembers of the "Silent Keys," to keep ham radio from seeing itself on that list. 73

Contact Jozef Hand-Boniakowski WB2MIC at RR #1, Box 1010, Wells VT 05774.

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73 Review

by Angelo J. Polvere KA9CSO

FCC Study Diskettes

For MS-DOS computers.

Diamond Systems, Inc.
PO Box 48301
Niles IL 60648
Tel. (312) 763–1722
Price Class: $40, Novice tape.

Put together the wide proliferation of personal oomputers and the desire to attract young people into the hobby of amateur radio, and you come up with the study courses on diskettes offered by Diamond Systems, Inc., of Niles, Illinois. You don't have to be young or a computer whiz, however, to make good use of these study courses. The young, dynamic leadership of this software company, who also provides instructional material for other fields, such as aviation and paramedics, has designed a course which is user-friendly, effective, and best of all, is a lot of fun.

The diskette comes in a sturdy box containing an easy-to-follow, well-written explanation for use on computers with the MS-DOS operating system. Each course provides all the information necessary to take the FCC test for which it was prepared. The Novice Edition contains a theory section and a code practice section.

The theory section includes over 370 questions taken from the latest release by the FCC Volunteer Examiner Program. These are the actual questions and multiple choice answers you will find on the tests administered by Volunteer Examiners. The code section permits the student to select his own code speed and to shape the characters to his liking. For example, even though the code speed of 5 words per minute is chosen, the characters can sound as if they were sent at 13 wpm. This enables the student to upgrade his speed capability more easily.

The theory menu contains a list of subjects for the student to select from, such as Rules and Regulations, Practical Circuits, and seven other categories. The user can generate a typical 30-question test, choose random questions on a subject, or select questions from the entire database. Each question appears on the screen with four multiple-choice answers. The student can either select what he thinks is the correct answer, or he can request help. The help screen gives a detailed explanation of the question, in which is contained the correct answer. The student then returns to the question screen and selects an answer.

Score is kept by the computer, and the screen shows the number of correct and incorrect answers, and the number for which help was requested. Results from each training session are kept on the diskette in a separate file for each individual student, so that more than one member of a family or club can use the same diskette. For later training sessions the student can review questions missed on the previous session, resume where he left off, or select new random questions.

Answers are greeted with encouraging remarks on the screen, such as "no way" for an incorrect answer or "good going" for the right one. The variety of these remarks is such that it holds the attention of the student like a game.

Other features include the ability to print code practice and to adjust the tones for one's hearing preference. The Code section provides a number of practice QSOs, random characters or the ability to create a text file to your own liking. The entire course is fun to take, and even seasoned amateurs might want to give it a try to hone their skills or to just check up on their own forgotten knowledge.

I took the Novice test, and confess to not getting a perfect score, hi. With trepidation I intend to take the tests for the higher grades, which Diamond Systems also offers, even though I hold an Advanced ticket. Corresponding disk and diskette license courses for Technician, General, Advanced and Extra Class are available direct from Diamond Systems, or from Erickson Communications, Amateur Electronics Supply, Heath Co., and other amateur outlets, at affordable prices, and are well worth getting. 73

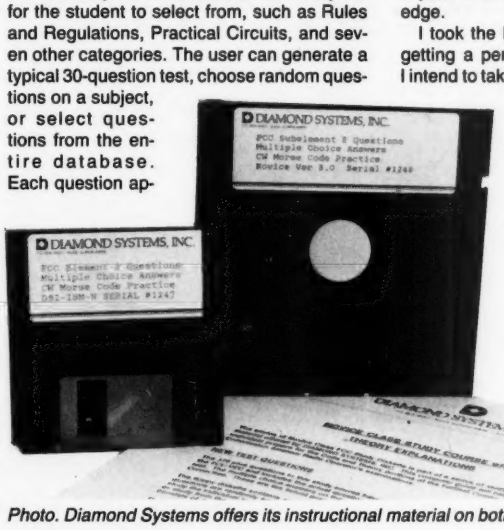

Photo. Diamond Systems offers its instructional material on both of the most popular disk sizes.

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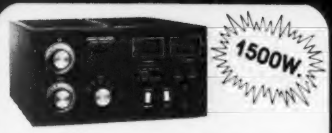

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- Pressurized plenum cooling system
- DC antenna relay for hum-free operation
- Illuminated SWR and power meters
- Vernier tuning for accurate settings
- Pi-L output for greater harmonic attenuation

Ruggedly constructed of proven design, this amplifier reflects the manufacturer's critical attention to details–such as the silver-plated tank coil for maximum efficiency. Cathode zener fuse and internal/external cooling are among the protective and safety devices employed. Input and output impedances are 50 ohms.

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The Barker & Williamson VS1500A antenna coupler is designed to match virtually any receiver, transmitter or transceiver in the 160 to 10 meter range (1.8 to 30 MHz) with up to 1500 watts RF power to almost any antenna, including dipoles, inverted vees, verticals, mobile whips, beams, random wires and others, fed by coax cable, balanced lines or a single wire. A 1:4 balun is built in for connection to balanced lines.

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CIRCLE 53 ON READER SERVICE CARD

Big But Cheap!

Put a big signal on 40 meters for under $20.

by Bill Crowley K1NIT

Forty meters is truly a DXer's dilemma. There's plenty of DX to be worked, but you need more than a barefoot rig with a dipole. Big antennas and big linears require even bigger money.

I don't have big money so I set out to find an inexpensive solution. The criteria: The antenna had to be fixed-directional (preferably to the north to take advantage of polar F-layer propagation), it would hopefully have 3 dB points at least 30 degrees apart yet still produce some useful gain, it had to fit on my 55-foot tower and half-acre house lot, and it had to be **CHEAP**.

First up was a four-element log-periodic dipole array (LPDA) as described on page 21 of the August 1986 issue of *QST* ("Construct a Wire Log-Periodic Dipole Array for 80 and 40 Meters," by John J. Uhl KV5E). Everything I had ever heard about LPDAs proved to be true. They are difficult to tune, but if and when you hit it right, they provide tremendous results. The LPDA fulfilled all the parameters except that the beamwidth was extremely narrow, something on the order of 15 degrees when constructed according to the article. Since the front support for the antenna was a maple tree in the front yard (very hard to relocate for a better antenna heading) that meant I had a dynamite signal into Japan, and the rest of the world heard me better when I used my dipole. Time to look for a better solution.

The Path to Success

The solution came in the form of a cross between the LPDA and a good old-fashioned three-element yagi. I used absolute minimum spacing between the elements (0.1 wavelength) because at 40 meters even that covers a lot of space. However, if the boomlength is not a problem, you can get a slight gain improvement by wide-spacing the elements, and the elements will actually be shorter. See Table 1 for comparative dimensions.

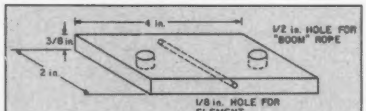

Figure 1. Director/reflector center piece (not to scale).

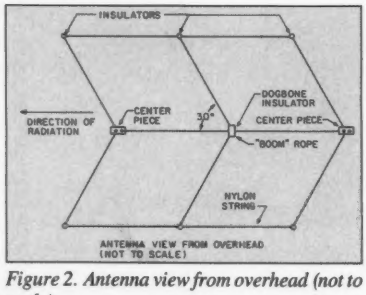

Figure 2. Antenna view from overhead (not to scale).

The antenna is simplicity itself—three pieces of wire, which if purchased new at Radio Shack, should set you back less than $15! Add in another three dollars for insulators, and that's all you need.

Cut the elements in accordance with Table 1; note that the director and reflector are each one single piece of wire. The center insulator of the driven element on my version is a ceramic dogbone, because I happened to have one lying around. If you have a 1:1 balun, use it, or if you want to make a center insulator out of PVC, acrylic plastic, Bakelite or petrified wood, have fun. Anything will work.

I made the reflector and director center pieces out of ¼" acrylic, and then slid them on the elements and held them in place with liberal amounts of plastic electrical tape. Crimp-on connectors either side of the center piece would probably also work as well. Try to avoid solder because it can create a rigid area next to the centerpiece which could lead to physical failure because of repeated flexing when the wind blows. The "boom" is 3/16" nylon rope, but just about anything you have around the shack will probably work *EXCEPT* yellow polypropylene rope which deteriorates rapidly when exposed to the ultraviolet radiation in sunlight.

The secret to success for this antenna is to angle the elements forward about 30 degrees, à la the LPDA. This simple maneuver will add about 3 dB forward gain, the same as doubling your output power, and it won't cost a penny extra!

I used a 500-pound test nylon string to keep the elements parallel. Despite the misgivings of several local "experts," the whole antenna made it through a Maine winter with no problems.

My "dipole" is actually a trap "tripole" with two different length elements on one side of the balun to increase the bandwidth on 80/75. On 40, however, the elements are the same length. The performance figures for the antenna described here are mostly just observed estimates (that's one step above an educated guess) but from on-the-air comparisons with the dipole the forward gain seems to be in the neighborhood of 12 dB, the front-to-back ratio about 20 dB, and the front-to-side ratio about 30 dB. The beamwidth is approximately 35 degrees, giving reasonable coverage from Asia to Europe to the Middle East with its 355 degree aim point. Stations I can't even hear with the dipole are head and shoulders above the noise level on the yagi.

The antenna does have one disadvantage. When the rest of the locals come over to check out your new weapon, they'll probably drive right past your QTH the first time—everybody knows a killer array this good will be visible from miles away! So if you're tired of not being heard on 40 meters and the spare bucks are few and far between, give this $20 giant killer a try. You won't be disappointed. 73

Contact Bill Crowley K1NIT at RFD 1, Box 1589, Hallowell ME 04347.

Table 1. Element Dimensions

0.1 wavelength element spacing:	13.86 ft.
Reflector:	70.42 ft.
Driven:	66.83 ft.
Director:	65.49 ft.
0.15 wavelength element spacing:	20.79 ft.
Reflector:	69.79 ft.
Driven:	66.48 ft.
Director:	64.79 ft.
0.2 wavelength element spacing:	27.72 ft.
Reflector:	69.01 ft.
Driven:	66.13 ft.
Director:	63.66 ft.
0.25 wavelength element spacing:	34.65 ft.
Reflector:	68.17 ft.
Driven:	65.19 ft.
Director:	61.69 ft.
0.3 wavelength element spacing:	41.58 ft.
Reflector:	67.61 ft.
Driven:	65.85 ft.
Director:	61.27 ft.

Note: Dimensions are calculated based on a design frequency of 7100 kHz, which should result in an SWR of less than 2.5:1 across the entire band, under most applications.

Materials

Quantity	Item	Source	Price	Total Cost
3	Antenna wire	RS 278-1329	$ 4.99	$14.97
6	End insulators	RS 278-1333	2/$0.69	2.07
1	Dogbone insulator	Flea market	$ 0.50	0.50
			Total	$17.54

GREETINGS & GOOD NEWS FROM THE HAMS AT RAMSEY ELECTRONICS INC.

The worldwide acceptance of professional Ramsey service and lab equipment is giving us a chance to take a fresh look at the always-growing lineup of economical Ramsey ham kits and Mini-kits. Now that we're set up in our new factory building, we're working to make all our kits more fun and interesting than ever to build and to use. As we release both new kits and familiar ones with new step-by-step assembly manuals, we first want to say THANK YOU to all of you who have built our kits from brief instruction sheets. YOU are the people who showed us that U.S. hams, hobbyists and young newcomers really DO want to save money, learn and have fun by building your own electronic gear. Thanks!

If you've built our kits before, send us an SASE with your next order (marked with kit model number), include proof of purchase, and we'll be glad to send you the new instruction book as soon as it is ready.

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Our Order Terms remain simple and friendly, and we hope to hear from you soon.

73 from the Hams at Ramsey!

John, N2HWA/VP5JR
Jim, KB2FEC
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• RAMSEY TRANSMITTER KITS FEATURE INTERNATIONAL QRP FREQUENCIES!
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__	PS-1	89.95	1.5 Ghz. Prescaler (wired & tested)
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__	HR-30	24.95	Amateur 30 Meter Receiver Kit
__	HR-40	24.95	Amateur 40 Meter Receiver Kit
__	HR-80	24.95	Amateur 80 Meter Receiver Kit
__	HR-160	24.95	Amateur 160 Meter Receiver Kit
__	CHR-1	12.95	Case and Knob Kit for HR-series Receiver Kits
__	QRP-20	29.95	VXO 20 Meter Transmitter Kit with 14.060 crystal "A"
__	QRP-30	29.95	VXO 30 Meter Transmitter Kit with 10.107 crystal "A"
__	TX-30	39.95	6-watt 10.1-10.120 Mhz. 2-crystal VXO Transmitter
__	QRP-40	29.95	VXO 40 Meter Transmitter Kit with 7.040 crystal "A"
__	QRP-80	29.95	VXO 80 Meter Transmitter Kit with 3.560 crystal "A"
__	CQRP-1	12.95	Case and Knob Kit for Transmitters
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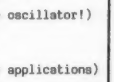

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__	FM-2	7.95	FM Wireless Kit with Mike Preamp Stage
__	MC-1	2.95	Sensitive Mike Cartridge
__	FM-3	16.95	Wireless FM Minimike Kit with case, battery
__	FM-4	12.95	High-Power FM Mike Kit
__	PB-1	14.95	Telephone Transmitter Kit
__	FR-1	14.95	FM Receiver Kit (tunes approx. 70-130 MHz.)
__	BN-9	5.95	"Super Sleuth" Multi-Purpose 2-watt LM380 Amp Kit
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Two Meter Portable Quad

Sturdy, easy to build.

by Charles W. Pearce, Ph.D. K3YWY

What I needed was a small, rugged 2 meter antenna I could use for various applications, including portable operation. Initially, I wanted to use it as a satellite uplink or downlink antenna without Az-El control, so I also needed a wide beamwidth with reasonable gain. I decided on a 2-element quad, running wire inside ½" PVC water pipe. The result was a sturdy, waterproof antenna.

To correctly size the elements, I used a test dipole to determine the velocity factor of #14 wire inside the PVC pipe. After plotting SWR versus frequency, I found the resonant frequency. Next, I encased the test dipole in the half-inch PVC pipe and repeated the measurements. The ratio of the resonant frequencies represented the velocity factor, which in my case was 0.98 for a dipole of #14 bare wire. Then I used the factor to adjust the size of the quad elements from their values in air.

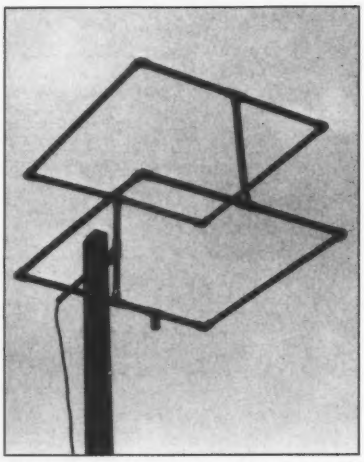

Photo. Easy to construct and versatile, this portable 2m antenna is also easy to mount.

Construction Details

The antenna is constructed from ½" white PVC water pipe and fittings. Table 1. lists the materials. Fig. 1 is a sketch of the driven element and reflector. Table 2. lists the pipe lengths for an antenna resonant at 147 MHz. You can change the resonant frequency by varying the long pipe lengths by ¼" per MHz and the shorter ones by ⅛" per MHz. Do not alter the spacer pipes.

To assemble each element, cut the pipes, then insert the wire through the pipe and fittings. Do not glue at this time. Keep the wire as taut as possible. Be sure to leave extra wire so that you can bring the ends out through the tee for the driven element. For the reflector, cross the wire inside the tee, and spot solder. The driven element is fed with RG-58 coaxial cable. No balun is used. Solder the inner conductor to one side of the loop and the braid to the other side, as far inside the tee as possible. If your solder connections are made outside the tee, the effective lengths of the elements are altered. It is possible to build the antenna this way if the lengths shown in Table 2 are shortened accordingly, but I have not constructed one this way myself.

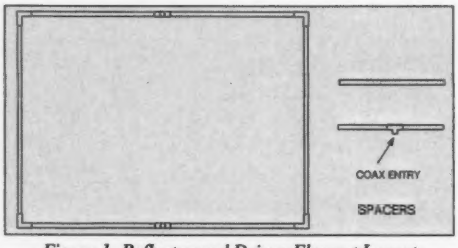

Figure 1. Reflector and Driven Element Layout

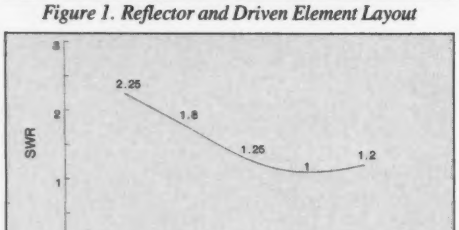

Figure 2. SWR vs Frequency

Assemble the antenna without glue, and check its SWR and resonant frequency. If the resonant frequency is high, you can lower it in the following manner: First, #14 wire with insulation decreases the velocity factor still further. The factor compared to bare wire was 0.97 (for the type of wire I used) as determined from test dipole measurements. Insulating the wire shifts the resonant frequency about 4 MHz. If you are high by 1 MHz, for example, keep three-fourths of your wire bare and insulate one-fourth of it. This would apply to both elements. If you are too low in frequency, trim the pipe lengths as previously mentioned.

Once you're satisfied with the antenna, unsolder the connections and disassemble the pieces. It's best to glue each element separately. Start at an elbow and glue each piece in turn. Do this on a flat surface to eliminate any twisting on the loops. Cant the tees in the driven element outward a few degrees and those on the reflector inward to account for the different loop sizes. The PVC glue sets up fast, so be careful to do everything right the first time. Make the solder connections as before, then assemble the two elements together. A little caulking or sealant should be used to seal the antenna where the coax exits the antenna.

Performance

The design frequency was 146 MHz, but the antenna actually resonated at 147 MHz, as you can see in Figure 2. However, the antenna is broadbanded enough so that this isn't a problem; the SWR is only 2.25 at 144 MHz. In actual use, as a vertical satellite uplink antenna, I have been able to access RS-10 out to about 20 degrees above the horizon, using 80 watts and a 50-foot RG-58 feedline. As a downlink antenna for OSCAR 13, it enabled me to copy Mode B using a 2 dB NF preamp at the receiver and the same feedline. Even pointed straight up, it allowed me to work all the local repeaters.

Summary

This antenna is inexpensive and simple to construct. It performs well, and gives long service. It is also an interesting learning project, as you gain insight into the concept of velocity factor. It should be easy to design a 3-element version. Although I can't guarantee the velocity factors, you should be able to use this construction method for 50 and 220 MHz. 73

You may contact Charles W. Pearce K3YWY at 410 12th St., Emmeus PA 18049.

Table 1. List of Materials

Item	Quantity
90 elbow	8
Tee	5
½" PVC pipe	16'
#14 wire	16'
PVC glue	as required
RG-58 coax	as required
PVC Pipe Lengths	

Table 2. PVC Pipe Lengths

Size	Number	Use
20"	2	Reflector
9"	4	Reflector
19"	2	Driven element
9.5"	4	Driven element
10"	1	Spacer
3.5"	2	Spacer

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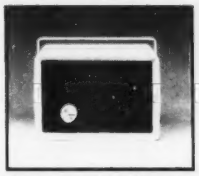

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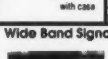

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73 Review *by J.S. Gurske K9EYY*

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Radio facsimile for satellite images has been a long-time interest of mine. I've printed many pictures using home-made machines, photographic paper, and cold cathode light sources. When I saw advertisements in amateur radio publications for PC HF Facsimile 4.0 by John E. Hoot of Software Systems Consulting, I was immediately interested. He claimed he could receive FAX images on a computer monitor using HF signals. They really looked good in the advertisement.

I sent for the program and put it on my computer. To say that I was satisfied would be gross understatement. But let me tell you about it.

The package currently sells for $99. When you purchase the program, you get: 1. a novel decoder (or demodulator) which requires NO external power source; 2. an audio cassette which describes FAX signals and tells you how to use the program; 3. an excellent manual; and 4. the program on a disk.

Easy Installation

Upon opening the package, I was first struck by the small size of the decoder. It fit on the end of an RS-232 connector. It doesn't require special boards or anything else; it only needs to be plugged into the serial port, either COM 1 or COM 2, of the computer. After plugging in the decoder, you connect the other end of the wire to the audio output jack of your HF receiver.

Loading the program into the computer was standard, with no surprises. The manual covers installation using floppy disks and hard disks, and for running the program on floppy disks only.

The manual instructs you to listen to the audio tape next, which is an excellent idea for this type of program. I have heard hundreds of FAX signals over the years, yet I found the tape very useful. While it cannot generate a picture, the tape does a fine job explaining facsimile signals and what they sound like. The tape is especially a good idea for those with limited experience in listening to FAX signals. It's also an excellent way to learn about the correct way to tune in a FAX signal.

Mr. Hoot has even incorporated a tuning indicator in his program. When you press the "T" key on the computer, the screen turns into a tuning indicator with two reference lines for aligning the tuned signal. The signal from the HF receiver appears as a third line. As you tune the signal, this third line moves up or down the screen, depending on whether you are tuning up or down. It is only necessary to tune the receiver so this third line lies about ⅛" above the top line on the screen for the carrier signal. When the signal starts to shift with the image being sent, the signals will fall between the two reference lines. For those of us who have had to tune FAX signals without such a device, this added touch is yet another reason the program is so user friendly.

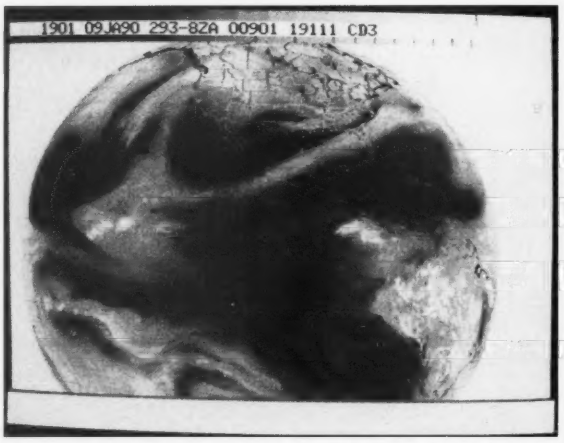

Photo A. The Earth's disk on Jan. 9, 1990 at about 2 PM CST, with infared view of streams of water vapor.

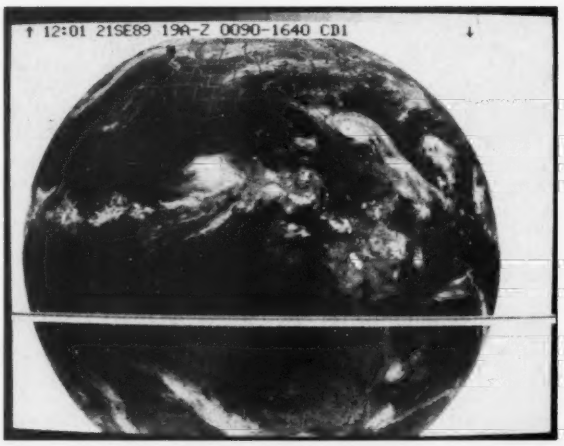

Photo B. Full-disk image of the Earth as Hurricane Hugo approaches the coasts of S. Carolina and Georgia.

Multiple Options

The main menu allows you to capture the image in color or monochrome, save it to disk automatically, go to the tuning scope, change the lines per minute for the type of picture you are receiving, i.e., 60, 90, 120, or 240 lines per minute. You can display the image, view the image, print the image, or zoom to a section of the image. In the file options you can set the prefix, list the directory, and write to or read from a file. Pressing "H" for "hardware" produces another screen with various options.

The first thing to adjust in the "hardware" mode is the timing for your particular computer. The "C" for "clocks per pixel" lets you set the course figure for your timing. Mine needed no changing. The "T" for "timing correction" makes the final adjustment so the picture is vertical on the screen. The 360 which comes with the program was merely changed in small increments until the picture was straight on the screen. Mine ended up at 220. This is a very easy adjustment to make.

The remaining options on this screen relate to your printer type, graphic card type, monitor type, demodulator port (COM 1 or 2), and scans per line (6 for CGA, 4 for EGA, 3 for VGA). I set mine at 3 because I use a VGA monitor, which produces the best resolution.

I tuned in a FAX signal and printed a picture. It was a full-disk image sent by NAM. When I

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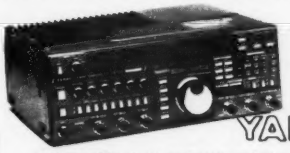

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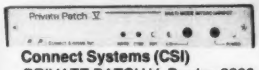

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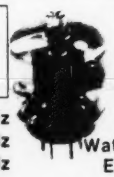

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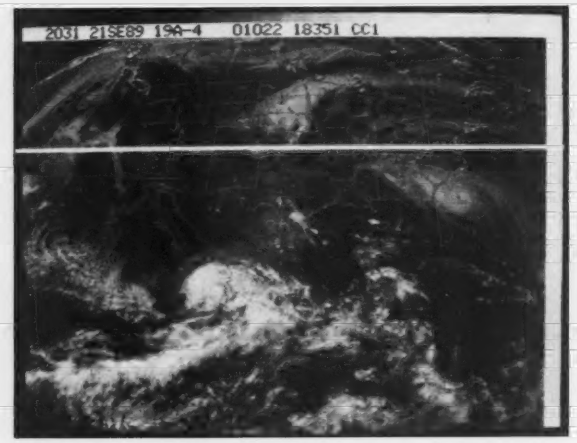

Photo C. Hurricane Hugo closer up, just off the S. Carolina coast on Sept. 21, 1989.

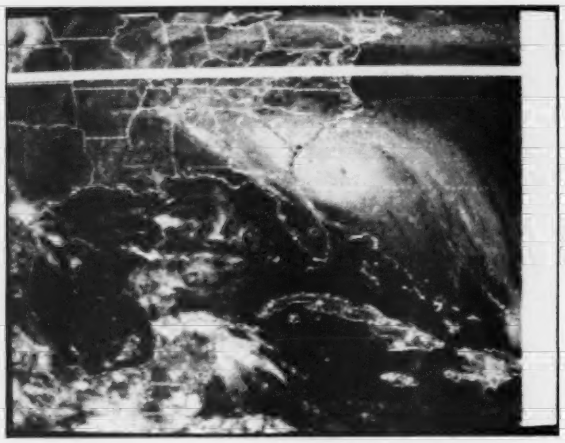

Photo D. Zoomed image of Hurricane Hugo, from Photo C.

saw the gray scale appear on the computer screen, I knew I had a good program even before the picture was sent. I was surprised to see that even with some noise on the signal (due to a bad antenna connector on my receiver), the picture was better than anything I had seen on a computer screen before.

I have copied many more images in the short time I have had the program, and they have all been good. I should add that the signal must be good to get a good picture, but this program seems to be more tolerant of noise than anything I have used before.

The accompanying pictures were taken with a Polaroid camera directly from the computer screen. Note the number of shades of gray in the upper left corner of each picture.

Mr. Hoot has even incorporated a long list of HF stations which send HF FAX signals. The list includes frequencies and times of day as well as the location of the station.

PC HF Facsimile 4.0 by John Hoot is a good buy—it works great! *[Ed. Note: Version 4.1 is now being shipped which allows the use of COM 3 and COM 4 serial ports]* 73

You may contact J.S. Gurske K9EYY at 7240 Highway Y, Lodi WI 53555.

Number 12 on your Feedback card

73 Book Review

A Radio Journal 1912–1940

A book full of memories.

reviewed by Larry Ledlow, Jr. NA5E

A Radio Journal 1912–1940
by Russ Rennaker W9CRC
Published by R&R Press
Kokomo, IN
Softbound, 69 Pages
Price: $9.00

Author Russ Rennaker W9CRC takes us on an amusing trip down memory lane with his book *A Radio Journal*. The book's 70 pages are chockfull of Russ' own recollections of his first interests in radio as well as wonderful anecdotes related to him by fellow workers in the broadcast industry. Russ' memory seems unclouded as he describes his early adventures. He gives the younger reader a feel for what it was like in the good ol' days, and I'm sure many old timers will find many memories of their own described in the book.

Russ grew up in rural Indiana, part of a farming family, but technology of the day held his attention more than plowing. At ten he discovered radio for himself after reading *The Sinking of the Titanic*. One chapter of the book described the wireless operator pounding out CQD (the distress signal of the day) in vain as the great ship went down. This chapter captivated Russ' imagination, and he began to explore the library to satisfy his hunger for information on the new technology of wireless.

Thanks to incredibly tolerant parents, Russ continued his own experiments with radio. Bad timing—the Department of Commerce suspended licensing during World War I—prevented him from obtaining an amateur radio license in 1917. In 1920 he finally obtained the call 9CRC.

The young experimenter made quite a reputation for himself building radios just as broadcasting began to take shape. Eventually he went to work for a local radio station as an engineer. From a humble beginning at a local 50 watt station, Russ' career eventually took him to CBS.

Russ has had the pleasure to work with many well known entertainers of the early radio days. He has also crossed paths with many respected broadcasting engineers. As a result, Russ shares many interesting behind-the-scenes stories about those he worked with. The early days of live "pick ups" were frought with potential disasters, and the Russ' anecdotes prove Murphy's Law beyond doubt. They also prove radio could be as fun behind the scenes as on the air, although for different reasons.

The book contains a number of fascinating photographs of early equipment, not the least of which is a 2kW quenched gap spark commercial transmitter dating to 1920. Amazing stuff!

In all, readers will find *A Radio Journal* a fascinating trip through time. It is very easy to read and informative. Readers of all ages will probably learn something from Russ' journal. W9CRC provides an entertaining and educational look back at the early days of radio. I can recommend it for a pleasant change from our hetic, high-tech lives of today. 73

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Tune in on the New Frontiers of VLF

Simple converter brings the low low bands in on 80-meter receivers.

by David Curry WD4PLI

Ever wanted to try Very Low Frequency (VLF) operation, but didn't know how to get into it? If so, and if you have 80m capability, you may want to try this project—the 80AU.

The 80AU provides active whip preamplification of an incoming signal, then upconverts it to the 80 meter amateur band. The unit's 5-element Chebyshev filtering eliminates broadcast and above frequencies. A balanced mixer rejects spurious signals, and it has phantom power capability for remote operation. Used in conjunction with a quality shortwave or 80 meter amateur receiver, this converter accurately converts all frequencies from 5 to 450 kHz, up to frequencies from 3.5 to 4 MHz.

There are many fascinating and unusual signals on the LF and VLF frequencies, as well as the activity within the 1750 meter band (160 to 190 kHz).

You can use any 5- to 10-foot wire for an antenna, but I highly recommend using a Citizen's Band 102″ steel whip, available at most electronics stores. With this whip, you can use the converter in remote and mobile operation, or on the top of a roof for clear, unobstructed reception. The wire antenna will also work, and you can use it if you are limited to "invisible antennas," such as in apartment complexes. Longer antennas will work, but they need a small series capacitor at the input port (J1). See the "Operation Requirements" section for more information on this.

The 80AU is very sensitive, so use a separate ground, located directly at the antenna site. A ground rod placed in the earth directly under the active whip and connected to the coax braid or the 80AU box, will provide the best ground reference, clean and free of noise. The coupling method shown in section B of the schematic is an excellent way to separate the two grounds and provide good broadband coverage. If you use this particular circuit, be sure to use battery power to eliminate any coupling to the AC power line.

Whip Placement

The active whip site is CRITICAL. Always locate it away from power lines and above or away from the house and other structures. At my house, the active whip is located right in the front yard near the sidewalk, against a chain link fence. The "higher the better" rule also applies, helping the signal-to-noise ratio by lessening capacitive coupling to structures where noise may be present.

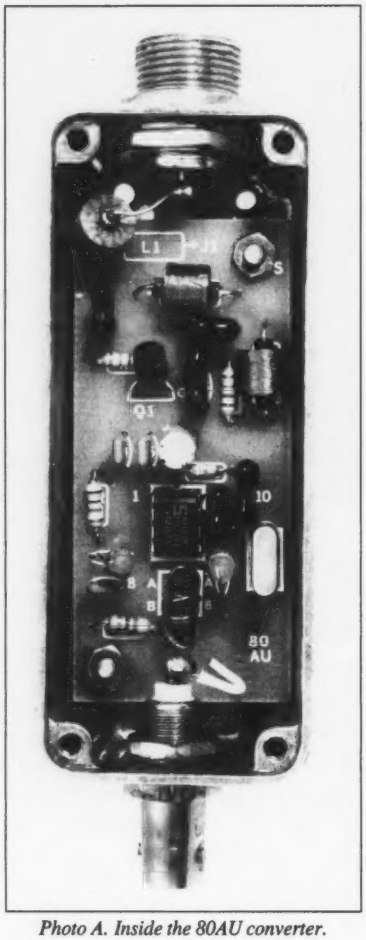

Photo A. Inside the 80AU converter.

Sometimes just moving the antenna 3 or 4 feet can make all the difference. Experiment after finding what you think might be the best area. A tree can be an excellent place, when the 80AU is placed on a wood pole at the very top, away from limbs. Use a wooden pole for mounting to avoid rust.

Tune In!

Once you've decided which coupling circuit method to use and you've "planted" your antenna, simply apply power and tune the receiver within the 3.5–4 MHz range. You can use the direct readout in kHz to accurately indicate the frequency if you are using an amateur receiver or any other type of receiver with a calibrated kHz display, either analog or digital. As an example, if you were listening to a signal and the frequency indicated on the dial was 3.680 MHz, then you would actually be receiving a signal at 180 kHz. The "3.5" is dropped or subtracted. This adjustment quickly becomes second nature.

Operation Requirements

The 80AU antenna input uses an SO-238 style plug, which interfaces with PL-259 plugs and banana-style jacks. You can use a longwire antenna by simply inserting a 39 pF capacitor between the 80AU input port and the longwire antenna. This works exceptionally well for untuned, broadband coverage. Tuned antennas can also be used in the manner described above, by coupling the tuned antenna lightly to the 80AU input through a 39 pF capacitor. However, a simple stainless steel 102″ CB whip provides the best consistent overall performance for portable and land-based installations.

Coupling Methods

The operation of the 80AU is simple. The unit typically is mounted remotely because it needs to be mounted near the active antenna; and the active antenna typically needs to be mounted away from the house to keep the received noise level as low as possible. For convenience, I power the unit using the coax that conducts the RF from the upconverter to the 80m transceiver.

You must use a coupling device end to apply power to the coax for "phantom" pow-

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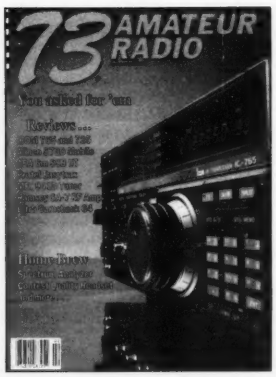

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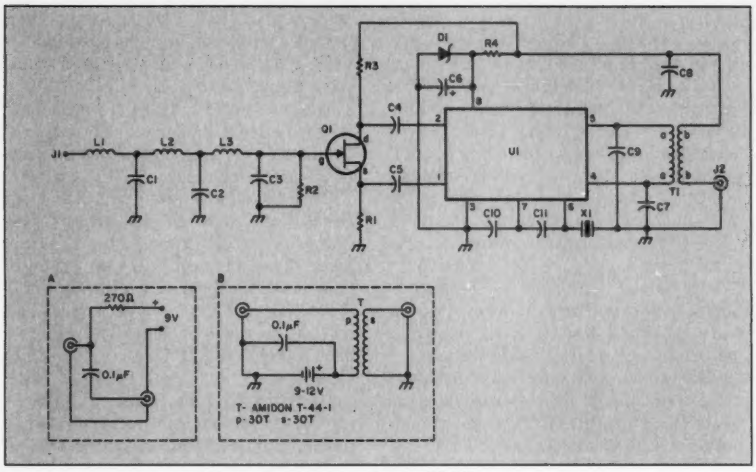

Figure 1. Schematic for the 80AU converter.

er, and to effectively couple the RF to the receiver. Notice the two methods drawn in sections "A" and "B" of the schematic.

Section A shows a simple resistor-capacitor combination that works well for mobile, remote or "clean" ground systems at home. Most ground systems in homes are "dirty" because the ground, or common, return for the AC power line carries the leftover remains from all the neighbors' light dimmers and power line hash. Also, it's securely coupled to the power lines over the course it takes from the power pole to the house. I suggest that you try to ground your system at the house, but even with this precaution there is no guarantee that the ground will "sink" all the noise, especially when the ground rod is placed in sandy or poorly conductive soil. The active whip will capacitively couple to the coax going to the 80AU and pick up all the noise, even if the 80AU is located far away from the house, where it can also couple to the power lines.

Parts List

Resistors: All ¼ watt, carbon composition.		
	R1–R3	22kΩR4470Ω
Capacitors	C1, 2	47pF NPO 50V DC/10%
	C3	30 pF NPO 50V DC/10%
	C4, 5, 8	0.1 μF/50V DC
	C6	4.7μF electrolytic, 16V DC
	C7, 9	470 pF NPO 50V DC/10%
	C10	150 pF NPO 50V DC/10%
	C11	47 pF NPO 50V DC/10%
Inductors	L1,3	8.2 mH Miller #70F823AI
	L2	9.1 mH Miller #70F913AI
Transistor, IC, Miscellaneous		
	Q1	J310 JFET
	U1	NE602
	X1	3.499 or 3.5 MHz Crystal
	T1	Output toroid transformer: Amidon T-37-3 Primary: 26 turns, #26 Ga. (black) Secondary: 5 turns, #22 Ga. (red)
	D1	1N753A
	2	Pairs of 4/40 nut and bolt, ½" length
	2	¼" spacers
	1	Aluminum housing, Hammond Mfg. 1590A
	1	SO-238 connector
	1	BNC connector

tor leads, and clip when through. Make sure that the bodies of the parts are against the board, and not lifted away after you've finished soldering.

Now insert and solder the capacitors. An oval shape drawn on the board identifies the locations for the capacitors. The polarity of these parts isn't important, but C6 is an electrolytic. It is identified by a small circle with a "+" on the upper left side, indicating where the positive lead should be inserted. Be sure that the negative and positive leads are identified and inserted into the board so that the polarity will match correctly.

Crystal X1 is identified by the frequency on the side of the part, which should be read either 3.499 MHz or 3.500. This should be inserted and soldered. Apply as little heat as possible to solder X1, as the crystal is temperature sensitive.

Final Assembly

Insert the large RF connector through the appropriate hole, from the inside of the box.

Technical Details

Input impedance	22kΩ
Input frequency response	5–450 kHz (450 kHz–3 dB point)
Converter output	3.5–4 MHz broadband
Filter passband ripple	0.4 dB
Mixer noise figure	0.5 dB
Mixer third order intercept point	–17 dBm
Mixer type	Doubly balanced, active bipolar
Power requirements	5 to 18V DC, 12 volts nominal approx. 30 mA

Construction

Spread out all the parts so that you can identify them using the the parts list. Be careful when you install the inductors (L1–L3) and the JFET (Q1). The JFET is VERY static-sensitive, so be sure that you and your soldering iron are well grounded. Insert Q1 last to avoid overheating and to reduce the chances of zapping the poor thing.

Use a small soldering pencil (NOT a soldering gun) between 25 and 60 watts, and a good quality rosin core solder. Find the NE602 IC and insert it into the board so that the key at the end of the IC will line up with the key drawn on the component-side silkscreen. Push it through and solder all the leads. Clip excess leads after you're done. Insert all parts from the component side, where the silk-screen is printed. Then insert diode D1 so that the band around the diode is aligned with the band drawn on the part silk-screen.

Now insert the resistors, using the parts list for correct insertion. The resistors are marked by an "R" showing where the body of the part should be placed. Solder diode D1 and all resis-

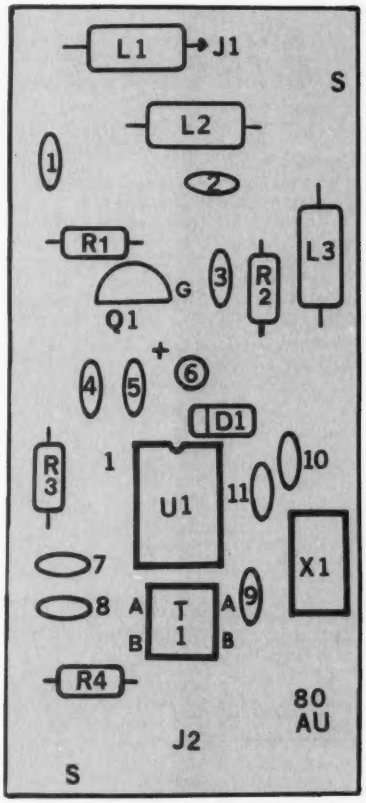

Figure 2. Components layout diagram.

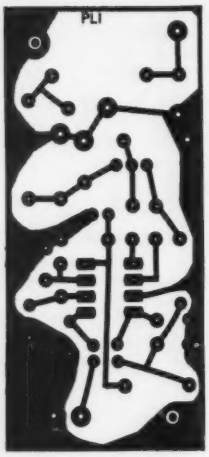

Figure 3. Interface foil pattern.

Once it is in place tighten it with the included bolt. Do the same with the remaining smaller BNC RF connector placed opposite the SO-238. Both connectors should have the solder lugs on the inside of the box.

Next, insert the two screws through the holes in the box from the outside and, holding the screws against the box with your fingers, put the ¼" spacers over the length of the screws inside the box. Take the circuit board and feed the screws through the holes marked "S." Then, push the board toward the bottom of the box, with all circuit board components facing toward you. Tighten the two 4/40 bolts against the circuit board to finish mounting the board securely. The spacers will lift the circuit board away from the box enough to prevent accidental shorting.

Cut the wire from J2 and solder it to the solder lug of the BNC connector. Also, cut and solder the remaining lead from L1 to the solder lug of the SO-238 connector. The body of L1 should rest at a near vertical angle to the circuit board, with the lead to the connector going across almost horizontally. It is important to keep this inductor as vertical as possible to minimize inductive coupling with L2. Also, keep in mind that you don't want L1 to sit too close to the aluminum box. Visually inspect the parts. When you're satisfied, close the lid and tighten the four screws.

Next, look at L1, L2 and L3. These parts are made of many, many turns of very fine wire, and have a manufacturer's number on the side to indicate which inductor to insert into the marked area on the board. All of the inductors indicated on the board are marked by an L. L1 is a little bit different: One lead is pointed toward J1, the terminal of the SO-238 connector, which will be mounted on the housing later. The other lead of L1 is soldered into the hole on the circuit board, just like L2 and L3.

Transformer T1 is a toroid or round transformer with four wire leads, two red and two black. All four leads need to be stripped of their enamel insulation. Use any fine sandpaper to remove the enamel, leaving the four wires bare and ready for soldering. Place the body of the toroid between the holes marked "A,A" and "B,B." The two small black wires, one on each side of the toroid, go into the holes marked "A." The remaining two red wires on each side of the toroid go into the holes marked "B." Pull the wires through the holes gently but firmly, then solder them well to the solder side. Inspect the solder joints, then clip the excess leads.

Take a small piece of copper wire about 1" long and insert it through the hole marked J2. Solder the wire on the foil side of the circuit board and clip any remaining lead length.

JFET Q1 is last to be inserted, with the shape of the transistor matching the shape drawn on the component side silk-screen. Insert the three leads so that the JFET body remains approximately ¼" inch from the circuit board. Solder all three leads quickly so that you don't overheat and damage the device. Clip excess leads after soldering.

Check all the parts one last time against the parts list for correct part insertion. Visually check for any accidental solder bridging on the solder side of the circuit board.

A kit for this project, including the circuit board, housing, and all the parts, is available for $59, postpaid. I will also make just the etched board available for $7.50, postpaid. Contact *Curry Communications, 852 N. Lima, Burbank CA 91505.*

David Curry WD4PLI has been a ham for over 15 years. He specializes in RF electronics. Dave is also a professional musician, and owns a small communications business, Curry Communications, which specializes in small electronics kits. Contact him at 852 N. Lima Street, Burbank CA 91505.

Number 14 on your Feedback card

CIRCUITS

Great Ideas From Our Readers

Heathkit HW-8 Speaker

The HW-8 is a fine rig, but you have to use high impedance headphones for listening. Sometimes, two or more people would like to listen at the same time; other times, you might like to listen via a speaker as you work around the shack. Also, some of us hate wearing cans!

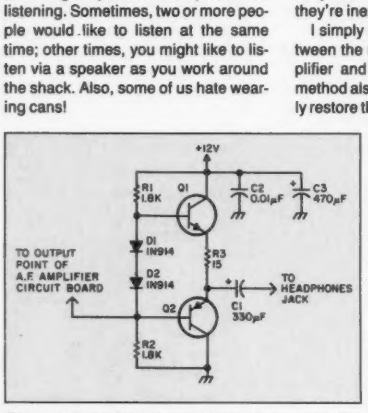

Figure 1. Parts for this modification are easy to find and inexpensive.

The only thing keeping the original circuit from directly driving a speaker is the high output impedance of the rig's transistor audio output amplifier. I came up with a mod to let the rig drive an 8 ohm speaker to a comfortable listening level. It mounts on the back chassis, adds little to the rig's current draw, and is not a major re-design. Finally, parts are not critical, and they're easy to salvage. If you must buy them, they're inexpensive.

I simply cascaded an extra amp between the receiver's audio output amplifier and the headphone jack. This method also ensures that you can easily restore the rig to its original condition if you want to sell it or try a different experiment.

My solution was a simple complementary push-pull amplifier. This circuit's idling current is only a few milliamperes, and since the voltage gain is around one, oscillation problems are minimized.

Figure 1 shows the circuit. I used a pair of salvaged silicon transistors close to the 2N2222/2N2907 combination. Two silicon diodes (D1 and D2) are used for biasing; any switching or rectifier diodes should be fine.

The values used at R1, R2, and R3 set the current draw. The trade here is between low current and low distortion. For this circuit, an idling current of about 3 milliamperes seems to be a good compromise. R1 and R2 should be the same value to set the idling output voltage at about one-half supply voltage. This is necessary to allow a full swing in output. R3 thermally stabilizes Q1 and Q2, and lowers the gain a little. This is the resistor to change to set the idling current of Q1 and Q2.

C1 is used as a coupling capacitor. Its x_c should be low compared to the speaker at the lowest operating frequency. Using an 8 ohm speaker and 500 Hz, this comes to an ideal minimum value of around 330 µF. C2 and C3 are for decoupling and RF bypassing. I recommend a value of several hundred pF to around 0.01 µF for C2, and several hundred µF for C3. Be sure that all capacitors have a voltage rating of at least 20 volts.

I built this circuit on a small piece of perforated board, tested it for current draw and any excess heat, and verified that it worked, all even before I took the cover off of the rig. This could also make a good output amplifier for many of the direct conversion sets popular in QRP work. In this case, it wound up putting my HW-8 on the air more often than before.

Larry Gotts WA3UKC
Box 490, Susquehanna University
Selinsgrove PA 17870

Improve Drake TR-6 Front End

The Drake TR-6 six meter transceivers originally used TI-588 transistors in the RF amplifier stages. Since the original design, transistors with more gain and lower noise figures have been developed. At present, the best device for the job is the U-310 FET. These are available from RF Parts, 1320-16 Grand Ave., San Marcos CA 92069 ($15 minimum order).

If you're at all handy with a soldering pencil, and you have *two* pairs of hemostats or locking scissor-type tweezers to use as heatsinks, you can easily perform the modification. Remove the bottom cover of the set. Locate the double compartment just to the rear of the REC GAIN control. The second half of the compartment contains a slug-tuned coil (L10) and the two RF amp transistors (Q11 and Q12). Observe the layout in Figure 2 to make the change.

[FETs are easily destroyed by static discharge or excessive heat. Follow all normal anti-static precautions, and use TWO locking-type heatsinks, as the author suggests, when soldering connections common to both devices!—Eds.]

L.J. Hemmis K3VLQ
919 West Gore Rd.
Erie PA

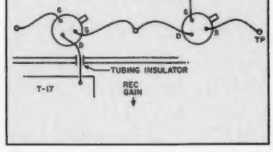

Figure 2. The U-310 FET is best for the job.

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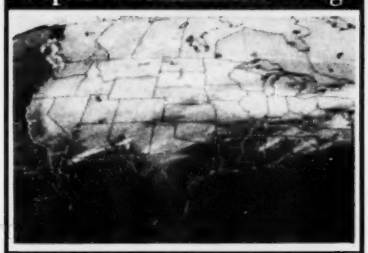

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CIRCLE 6 ON READER SERVICE CARD

Experimental Gaussmeter

Low cost, easy construction.

by J. Frank Brumbaugh KB4ZGC

Continuing publicity warns of the danger of continued exposure to magnetic fields generated by everything from toasters, TV sets and electric blankets to amateur radio equipment and high voltage power lines. Wayne Green W2NSD has suggested numerous times in his editorials that hams could use a cheap, simple and sensitive gaussmeter.

This gaussmeter is a junk box project, and represents only one approach to the design of such an instrument. I offer it neither as the only, nor even the best, method of detecting and measuring magnetic fields, but rather as a "foot in the door" design which I hope others will improve upon. I have purposely kept it simple—no bells and whistles—so even a beginning ham can build it at minimum cost and know how to use it.

A gaussmeter will detect only dynamic—moving—magnetic fields, such as those generated by an alternating current. Static magnetic fields, produced by magnets, can be detected only by moving either the probe or the magnet, so that the lines of force, cutting the probe coil, increase and decrease in strength, allowing the gaussmeter to detect and measure them.

Circuit and Winding

The circuit of this experimental gaussmeter is illustrated in Figure 1. When magnetic lines of force cut the coil in the probe, a voltage is induced which is applied to the inverting and noninverting inputs of IC1 in push-pull. This voltage is amplified and then applied through R2 to the base input of a Darlington pair of 2N3904 transistors, Q1 and Q2. This pair of transistors amplifies and inverts the input voltage across the collector resistor, R3.

Collector voltage swing is monitored by a 0–1 mA meter which is zeroed by ZERO potentiometer R6. Thus, meter indication will increase in proportion to the strength of the magnetic field detected. The resistor in series with M1 allows the meter to measure the full voltage swing across R3, which will vary from about 8 or 8.5 volts to near zero volts in the presence of a fairly strong magnetic field.

The instrument is powered by a 9-volt battery, BT1. Current drain is 10 mA with no magnetic field detected, and increases to nearly 15 mA at maximum. S1, the ON-OFF switch, is a part of the ZERO adjust pot, R6.

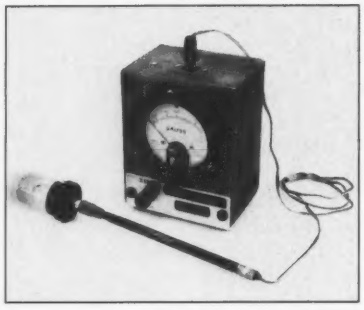

Photo A.

Probe Coil

The probe I used, illustrated in Figure 2, is made from the winding of one of the AF filter chokes removed from a US Navy 1020 Hz Range Filter, WW II surplus. The winding consists of approximately 1000 feet of AWG 28 enamel-covered wire. Its DC resistance is 70 ohms. Cross section of the coil is about ¼" x ⅜" and the diameter of the pie is approximately 1". The central hole, left when I removed the core laminations, is about 7/16" square.

I wrapped the coil in aluminum foil to form an electrostatic shield so the instrument would respond only to magnetic fields, and installed it in a plastic 35mm film can. An aluminum film can would be better, but I didn't have one. The container used to hold the probe coil must be nonferrous—not made of iron or steel. A pair of insulated wires are connected to the ends of the probe coil, and the other ends connect to the two inputs of IC1.

The probe coil is extremely important in this gaussmeter. It must contain enough wire—many turns—so the maximum number of turns can be cut by the external magnetic field, but the resistance should not be too great or too little. Most hams have small chokes and audio transformers in their junk boxes, and this is the best place to look for your probe coil. You can make a quick check with an ohmmeter and a magnet.

Measure the resistance of your coil, and with the ohmmeter attached, pass the magnet rapidly across the end of the coil. If the ohmmeter swings widely, the coil will probably be usable in your probe. If there is insufficient swing, try another coil. Primarily, the probe requires many turns of wire, but not too great a DC resistance.

Simple but Sensitive

This gaussmeter, though extremely simple, is quite sensitive. With 117V AC 60 Hz applied to the primary of a power transformer, and with no load current being drawn from the transformer, a weak magnetic field will be produced around the (unshielded) transformer. Bringing the probe coil near the transformer will develop nearly full-scale indication on meter M1. Swinging the probe across any magnet—a refrigerator magnet will do—will produce a high peak on the meter as the probe crosses the magnet. Moving the probe across the lower portion of any d'Arsonval meter, or the vicinity of the voice coil on your speaker, will produce the same results.

Parts Used

All the parts I used came from my junk box, which is why I used an LM324 quad op amp, when only one section is used. You can substitute it with just about any comparable op amp. Likewise, though the transistors in the Darlington connection are 2N3904, you can use any similar general purpose NPN transistors: 2N2222, 2N4124, MPS6531, etc. For M1, you can use any meter you might have lying around, up to and including a 10V DC voltmeter. If you use a more sensitive meter than 0–1 mA, change the value of R5 appropriately, so the meter will measure about 8V DC full scale. Many small 100 uA and 200 uA meters are available from most parts suppliers for a dollar or two. You can get the other parts at Radio Shack or from mail order dealers, who will

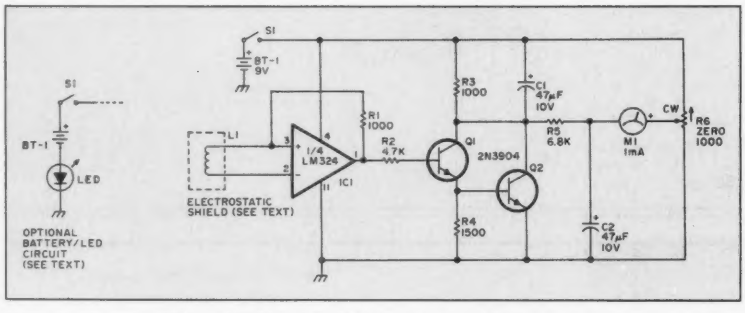

Figure 1. Schematic of the experimental gaussmeter.

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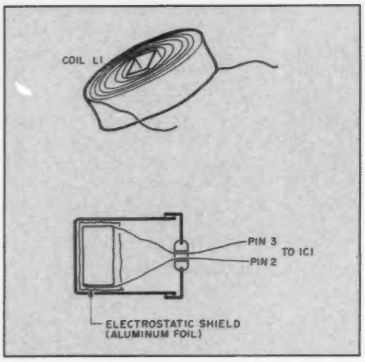

Figure 2. The probe, showing the coil and L1 mounted in a 35mm film can.

probably have better prices.

This experimental gaussmeter is a prototype, purposely made as simple as possible to test the design. It is calibrated in gauss, with calibration points at 50, 75, 100, 150, and 200 gauss. I used a Standard Magnetic Field Generator which I designed for calibration. (See below.) Some of you may have access to magnetic standards at work, and will know how to calibrate your gaussmeter. Hopefully, some of you will improve upon this design. Let's hear from you!

Important Details

Note in Figure 1 that feedback resistor R1 is not connected to the "-" input as is normally done when you use op amps. This is done on purpose to increase the sensitivity of the gaussmeter. Connecting R1 from the output (pin 1) to the "-" input (pin 2), the normal connection, reduces sensitivity and causes the meter to read backwards. If you do use this connection, adjust the ZERO pot, R6, for full scale meter reading with no magnetic field input. The meter will now read downwards on the scale in the presence of a magnetic field. Switching this feedback resistor with a SPDT toggle switch will provide two ranges of magnetic field values.

If you wish, you may connect a miniature LED in series with the battery, BT1, to serve as a power-on indicator. This will not increase battery drain, but it will reduce the available operating voltage by about 2 volts, thus reducing the voltage swing monitored by meter M1. If you decide to use this "free" current source for the LED, change the value of R5 to 4.7k ohms.

Be sure to observe polarity of the LED, which will not be very bright, though brightness will increase with the detection of a magnetic field, using the connection of R1 (see Figure 1). If R1 is connected in the "normal" configuration described in the above paragraph, the LED will grow dim when a magnetic field is detected.

Parts List

BT1	9V battery
C1, C2	47 µF, 10V electrolytic cap.
IC1	LM324 (one op amp used)
L1	probe coil (see text and Fig.2)
M1	0–1 mA DC meter
Q1, Q2	general purpose NPN 2N2222, 2N3904, 2N4124, MPS6531, etc.
R1, R3	1000Ω, ¼W, 5%
R2	4.7kΩ, ¼W, 5%
R4	1.5kΩ, ¼W, 5%
R5	3.9kΩ, ¼W, 5%
R6	1000Ω, potentiometer with S1
S1	SPST switch on R6

Number 16 on your Feedback card

Standard Magnetic Field Generator

Build an instrument to calibrate your gaussmeter.

by J. Frank Brumbaugh KB4ZGC

Now that you've built your gaussmeter the next step is to build an instrument that will accurately calibrate it. This is an easy project, using a home-brew coil, a potentiometer and a plug-in wall transformer delivering low voltage AC. This instrument will generate standard magnetic fields that can be varied between about 20 and 1,500 gauss. The standard magnetic field is generated inside a solenoid coil. Increasing the current through this coil will increase the level of the field generated.

Figure 1 shows the circuit. Any small power transformer with a secondary voltage of 6 to 15 VAC can be used to power the instrument. I use a plug-in transformer which produces 8.2 VAC, rated at 224 mA, although at times I draw in an excess of 600 mA from it during the calibration process. Potentiometer R1 must be wire-wound, not composition, because of the magnitude of AC current passing through it. I used a 1,000 Ohm pot from my junk box to control coil current, allowing for generation of fields from under 20 to about 1,500 gauss inside the coil. Mount a pointer knob on the potentiometer so that calibration marks can be placed around the control on the panel.

The Standard Solenoid

The most important component is the coil—the standard solenoid. It is inside this coil that the standard fields are generated and where they must be sampled. The coil can be of practically any length. It must be close-wound with enamel-covered magnet wire, and the inside diameter of the coil form must be large enough to accept the probe of your gaussmeter. Coil form material can be of cardboard, plastic, or even a length of copper, brass or aluminum tubing. If a metal form is used (do not use iron or steel) it should be wrapped with a layer of plastic electrical tape to prevent inadvertent shorting of the coil. I used a plastic deodorant container.

The wire used to wind the coil must be large enough for the maximum current it will have to carry. The greater the strength of the magnetic field, the greater the coil current will be. I used AWG 26 enamel-covered copper wire, close-wound over a 5 cm length, approximately 110 turns. (Be sure to count turns! You will need this information later.) Also, try to make the coil winding length some multiple of 5 cm or 10 cm—5 cm is 5% of one meter, so the number of turns of wire in this length, multiplied by 20, gives the required "number of turns per meter" used to determine field strength in gauss. In the instrument described here, 110 turns multiplied by 20 equals 2200 turns per meter.

Calibration Procedure

Calibration requires measuring AC current in milliamperes. The AC milliammeter should be connected between J2 and J3, while the AC voltage used to power the instrument is fed into J1. Vary potentiometer R1 while noting the AC current. Use this current reading in the formula below to determine the gauss level of the generated magnetic field:

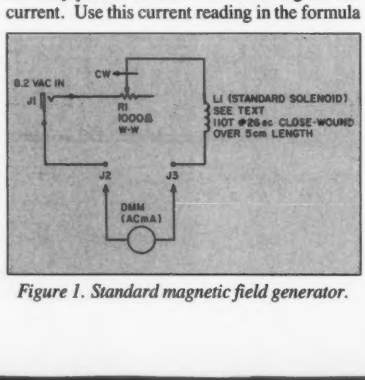

Figure 1. Standard magnetic field generator.

Gauss = Turns per Meter x AC Amperes (Coil Current)

In this instrument, with 8.2 VAC supplied, coil current varied between approximately 0.008 and 0.650 amperes AC.

To calibrate for specific values of field strength, use the following formula:

Coil Amperes = Gauss/Turns per Meter

Mark your calibrated gauss values on the front panel around the pointer knob in increments of your choice.

If your DMM will not measure AC current, you can measure the voltage across the coil—it will be in millivolts. Use this value and the DC resistance of the coil to calculate coil current using Ohm's Law.

Calibrating Your Gaussmeter

Connect a piece of wire between J2 and J3 on the field generator, then connect a lead between one end of the standard solenoid to your gaussmeter common ground. Turn the gaussmeter on and zero its meter. Insert the probe coil into the standard solenoid so it is centered in the middle of the coil. Apply AC power to the standard magnetic field generator. While watching the meter reading on your gaussmeter, rotate potentiometer R1 clockwise to the first calibration point which provides a meter indication. Mark this point on the meter face. Continue setting and marking additional calibration points on your gaussmeter over the full arc of the meter pointer. This procedure will calibrate your gaussmeter.

Contact J. Frank Brumbaugh KB4ZGC at 82 Liddell Street, Buffalo NY 14212-1824.

73 Book Review

The Cuckoo's Egg

Author: Clifford Stoll. Publisher: Doubleday, Bantam Doubleday Dell Publishing Group, Inc., 666 Fifth Avenue, New York NY 10103. Copyright, 1989. Price, $19.95. ISBN: 0-385-24946-2.

A hacker breaks into the Lawrence Berkeley Lab Unix computer, and no one notices. He carefully calls up a program left earlier. It hatches like a cuckoo's egg in another bird's nest, pretending to belong. The program has been collecting passwords.

The hacker then activates a little-known backdoor in the system software and has control of the computer, all of its functions and the widespread network of the machine's connections to other computers. The hacker has become a super user, able to access any account. Reaching out to closed military computers and US government systems, he picks through directories and downloads files at will. After carefully covering his tracks through the electronic network, he leaves. A small error, 75 cents, turns up in the Berkeley computer's accounting records, a leftover of the hacker's actions. It remains a minor glitch till the new system manager is asked to find the problem.

The Cuckoo's Egg by Cliff Stoll K7TA is a true story of the year-long search for an electronic spy, the "Hanover Hacker." In true Berkeley fashion, Cliff, an astronomer and unlikely computer wizard, does not appear to be a typical computer manager. Wearing T-shirts, faded jeans, long hair and sneakers, he must convince government agencies like the CIA, FBI and NSA that a very serious computer security problem exists. Even with solid proof that computer tampering and potentially sensitive military data is being compromised through holes in supposedly secure systems, he receives little cooperation until the government agencies realize that international espionage is involved.

When he is not at the lab monitoring the hacker's moves, Cliff employs his office PC to watch for the hacker. When triggered, his machine calls his pager number and, using creative software, sends letters via Morse code through the modem and out to his pocket receiver, telling him who is hacking and from which port on the Berkeley mainframe. Many a night's sleep and shopping expedition are interrupted in this fashion.

With help from Tymnet, a communications company that interconnects computers around the world, the hacker is traced via phone lines across the US, over the Atlantic via satellite, and into the heart of West Germany and the German Datex network. Further traces, done by following relay connections in local phone offices, pinpoint the hacker.

Computer enthusiasts will find the book fascinating as electronic signals are traced through hundreds of computers across the Western Hemisphere. Hams will appreciate the chase, similar to a transmitter hunt on VHF.

Some have complained that there is not enough insight into the West German hacker's motives or the spies behind the scenes. They have missed the point of the book. Here the pursuit, or quest, is the challenge, and the means are more important than the end. At the end of a transmitter hunt, emphasis is on how you got to the goal, not who was there. This is a captivating book, difficult to put down.

Although Cliff's original purpose was to put his computer logbook into a readable format to avoid repeating his story to those asking for details and advice, it has become much more. He has become an authority on computer security. After several weeks on *The New York Times* bestseller list, *The Cuckoo's Egg* has found exceptional interest among the general population as a thrilling and captivating spy story in an electronic world told by an unlikely '60s-style hero.

Before K7TA's "egg" hit the bestseller's lists, I had considerable difficulty locating a copy. If you can't find the book at your local bookstore, try Advanced Electronic Technologies, Suite 173, 5800-A N. Sharon Amity Road, Charlotte NC 28215. Tel. (704) 545-2681. They have it for $19.95 plus $5.00 shipping and handling. *The Cuckoo's Egg* is a real winner.

—Review by Andy MacAllister WA5ZIB

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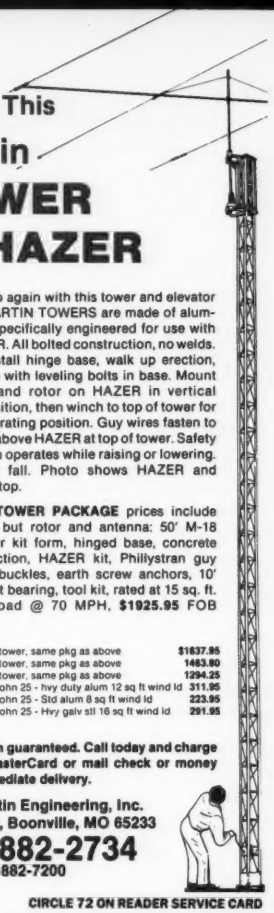

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The League Lemming Effect

Have you ever heard of the "League Lemming Effect"? Probably not, since it's a term I coined a few years ago. I was trying to explain to a ham buddy how the league is able to generate massive mailings to the FCC, Congress, and anyone else.

A lemming is a short-tailed, furry-footed rodent most noted for its mass migrations to the sea each year where many drown. Biologists haven't been able to explain this suicidal activity other than describing it as an instinctive reaction to overpopulation (the migrations occur during peak population levels). Instinctive behavior may be fine for lemmings, but humans do not need to rely on instinct alone. Humans are meant to think and reason.

People who react to outside stimuli with little sense of reason are like lemmings controlled by instinct alone. "Trekkies" who would give up their lives and fortunes to fly off to some distant galaxy with Capt. James T. Kirk and his crew on the *Enterprise* are a pretty good example of the lemming effect. Rationally, they know it's an impossibility, but their fanaticism overrides their judgment.

Now, let us apply the lemming effect to ham radio. Just about every major ham publication has its lemmings. So does the ARRL. Sometimes these people are called "groupies." Those who have followed the career of *73's* Wayne Green W2NSD call themselves "Wayne Watchers"—a designation that W2NSD once told me he abhors. Most publishers prefer to call their lemmings devoted and politically involved subscribers. The ARRL simply calls them "league members." In all cases, it is you and I who are considered lemmings, albeit never in public.

The lemming effect can be constructive or destructive. For example, when the hams of 220–222 MHz saw the threat of commercial takeover, their leaders were able to use the lemming effect to generate thousands of letters to the FCC in opposition to the change. While it may not have affected the outcome, it has caused a lot of would-be spectrum grabbers to think twice before going after the ham bands.

A decade ago, California attorney Joe Merdler N6AHU taught the ARRL how to arouse its members to political action. Aroused members encouraged congressional sentiment to force the FCC to act on malicious interference. The league was a fast learner; the first success of the "League Lemming" came in 1983. The FCC proposed a no-code license, and league members sat at their typewriters awaiting word from the "gods of Newington" as to whether they should write letters in favor of or opposed to the proposal.

When the ARRL hierarchy indicated that "no code was bad code," every lemming began to write virulent comments echoing the philosophy. Member after member dutifully—instinctively—wrote in support of the ARRL position, probably never bothering to read the proposal itself.

Were you one of those lemmings? Did you help kill no-code back in '83 only because the ARRL told you to? Did you detest no-code only because the ARRL detested no-code? Did you write a letter against no-code only because your ARRL director suggested that you write one? Did you engage typewriter without engaging brain?

Now we come to the 1990s. Seven years have passed. When Fred Maia (*W5YI Report* and *W5YI-VEC*) and Don Stoner W6TNS (National Amateur Radio Association) broached the no-code subject once again, the ARRL quickly took the lead in exploring the idea. It publicly formed its own No-Code Advisory Committee, and publicized the committee's work. It never told its members to write the FCC to favor the release of an NPRM on the idea, but it didn't have to. It was what the ARRL didn't say that was obvious. They were not publicly declared against the issuance of the NPRM, so therefore they must favor it. And, dutifully, the "lemmings" wrote in support of the ARRL position on release of a no-code NPRM—but only if it touted the "official ARRL doctrine."

PR Docket 90-55—Yes or No?

But now for the $64,000 question. The NPRM in the form of Docket 90-55 is out. Will the ARRL support it or try to shoot it down? It's not exactly what the league petitioned for. In fact, it's not really what any of the dozen or so petitioners want. While some of it follows the "league line"—pun intended—it also seems that the FCC is using the occasion to try to lighten its workload a bit. But not the way you might think.

It finally dawned on me the other day that the FCC doesn't want to get rid of the Novice and Tech Class licenses purely because of financial housekeeping. Only the Tech falls there. But to figure it out, I had to stop thinking like a normal human being and assume the position of a Washington bureaucrat.

The bureaucrats want to eliminate the Novice Class license because they fear that too many 11.5 meter "types" are getting Novice licenses without taking legitimate tests. Unlike the testing for other license classes, Novice testing is done outside the VEC system. Rather then considering it a blessing that they now have some control over the 11.5 meter ops by virtue of their obtaining ham tickets fraudulently—and then investigating and prosecuting such offenders—such enforcement is instead seen as a financial burden. While you "lemmings" may be saying, "Wow, what a great way to keep the CB riff-raff out," you are also praising a government agency for its failure to do its congressionally mandated job.

I believe retention of the Novice Class ticket is essential for us and the ARRL. Not because it's the traditional entry to amateur radio, but rather because it's the logical step up from a limited Communicator privilege. It takes a group of hams that could number in the tens of millions, and removes their isolation from 222–225 MHz and 440–450 MHz FM—where most will probably wind up—and gives them a sample of mainstream amateur radio on 10 meters. It does this with a fairly simple exam of 5 wpm Morse code. The FCC proposal is, in reality, that of going from no-code and minimal theory to 13 wpm code and a test for beginning engineers! Are they trying to create an "RF Ghetto" above 222 MHz? I cannot help but wonder.

If the FCC is adamantly determined to exterminate it, will the ARRL then say—as it did in 1983—that "no code is bad code"? And will all of you who are now in favor of a no-code license still think your own thoughts and write comments on Docket 90-55 that are truly yours? Or will you again put on your "furry feet" and follow your leaders to the death of our service in the sea of its own mire?

I have no idea what position our ARRL will take. I hope it strongly supports retention of the Novice license, but endorses all other aspects of Docket 90-55. I hope the FCC is willing to negotiate on the Novice license. If they want only four classes to administer, why not Communicator, Novice, General and Extra? That's a logical progression to me, so lets offer it and see how they react. Want to bet it will be unacceptable?

According to an MCI message I recently received from ARRL President Larry Price W4RA, sometime this summer the ARRL will file a public position on no-code, PR Docket 90-55, before the FCC. Will you simply echo the ARRL's position, or will you file—if you haven't already—comments of your own? If you just echo the ARRL line, you are naught but a "league lemming."

I for one hope that you are more than just a lemming. I hope that you are truly a person of your own. de WA6ITF

Number 18 on your Feedback card

HAM HELP

Your Bulletin Board

We are happy to provide Ham Help listings free on a space available basis. To make our job easier and to ensure that your listing is correct, please type or print your request clearly, double spaced, on a full (8½" x 11") sheet of paper. You may also upload a listing as E-mail to Sysop to the 73 BBS. Use upper- and lower-case letters where appropriate. Also, print numbers carefully—a 1, for example, can be misread as the letters l or i, or even the number 7. Thank you for your cooperation.

I would like to hear from anyone who could help me set up a radio club at my Shrine temple. Thanks. *Charles E. Martin AB4Y, 7103 Shawnee Way, Reynoldsburg OH 43068-5126.*

A dedicated Apple IIe user is looking for information and software accessories for the Apple Graphics Tablet & Tool Kit. Any info will be greatly appreciated. Please write first if money is involved. Will trade software. Thanks. *Geoff Malta N2HOQ, 5263 Deborah Drive, Piscataway NJ 08854.*

Wanted: YAESU FT-625RD memory option. *Charles T. Huth, 229 Melmore St., Tiffin OH 44883. 419–448–0007.*

Does anyone have the mods for the Heathkit HW-24-h dual-band transceiver/repeater? Any help would be appreciated. *Dave Digiuseppe, 5685 Hibernia Dr., Columbus OH 43232.*

Wanted: Information about any 12–17 meters modifications to HeathKit SB-102. Thank you. *Robert Ames N4SXG, 2105 South Indian River Drive, Fort Pierce FL 33450.*

I would like to know if anyone is aware of a modification for the Kenwood 2570 to extend the receive frequency range. *Hoyt Duff, 2209 Newbern Lane, Virginia Beach VA 23451.*

Needed: A copy of the Uniden Shop Manual for the Madison Base Station 11 Meter Radio. I would be glad to pay copying & postage for this manual. Please forward replies to *Jerry Ham, PO Box 405, Freehold NJ 07728.* Thanks and 73s.

Wanted: Ham programs for the Commodore VIC 20 computer. Terminal, CW, Packet, etc. Please send cost requirements and a description of the programs to *Ray Bergeron KA1UMW, 16 Church St., Lewiston ME 04240.*

I am working on a directory of publications that pertain to radio communications (electronics, amateur radio, CB, SWL, scanners, etc.). If anyone has anything to contribute to this directory or would like to correspond with me regarding this, please write to *Ryan Lughermo, PO Box 413, Midland MI 48640-0413.*

Needed: A card extender for an old Harris TR280 1940s radio. Will pay for this item. *Gary Dunlap, PO Box 3245, North Shore CA 92254. 619–393–1937.*

Wanted: Modification for ICOM-725 for all frequency operation. *Rick Thompson NØHKE, 13654 Hidden Creek Drive, Andover MN 55304.*

Needed: Schematic for KYOKUTO DENSHI Model FM 144-10sxr II, 2m mobile radio. Will pay all cost. *Ray Fallin WDØHCH, 253 W. Sumner St., Hartford WI 53027.*

I'd like to use my FAX machine on UHF. Could anyone give me information on FAX transmission standards or interface boxes? Also, several years ago, I got QSL cards printed by N&S Print, 2533 W. Orangewood Ave., in Phoenix, Arizona. They've gone out of business. Can anyone tell me who got their plates? TNX. *Klaus Spies WB9YBM, 8502 N. Oketo Ave., Niles IL 60648.*

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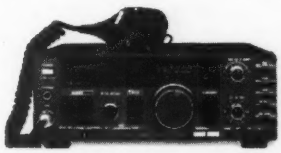

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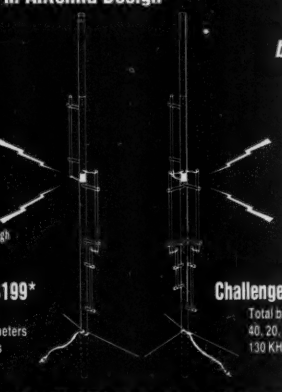

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ICOM Service Survey

It's almost painless . . .

by Gordon West WB6NOA

No one likes to send a radio back to the factory for service. It's a real pain to package it up, get it over to UPS, and wait patiently for the factory to fix it. But ICOM has made factory service almost PAINLESS. Its service department is well-structured and customer-oriented.

As soon as ICOM receives your unit, they send you a postcard to acknowledge receipt and the condition of your unit upon receipt. Knowing for sure that your unit was received intact is very reassuring. In addition to confirming that your rig made it, the postcard provides you with your repair tag number, box number, and an estimate on turnaround time.

ICOM Keeps Track

The extensive ICOM computer system tracks your transceiver every second through the roughly two-week repair cycle. The ICOM service team can find your rig quickly, and even tell you how many rigs are ahead of yours.

The ICOM service computer system also monitors repair patterns. Every week, the service manager analyzes these patterns and informs manufacturing of common failures so that they can make changes early to correct them.

Mark Allen WJ7X, former service manager, says, "We also monitor the performance of our bench technicians on our computer system." The computer keeps track of an award-point system for technicians meeting certain service goals. High performance statistics earn positive points, of course; but any unit that comes back with the same problem for repair earns the technician negative points!

Allen WJ7X: "Everything we do goes into the computer where it's carefully analyzed to provide our customers with the best possible service." The computerized readouts even give the number of minutes a telephone line was busy, and the time between incoming calls. For a typical month one year ago, the computer gives these statistics for customer service calls:

- Monthly amateur radio customer service calls: 788
- Land mobile customer service calls: 215
- Marine radio service calls: 419
- First service call question: out of band information
- Second most common question: status of unit in for repair
- Third common question: current product information
- Fourth common question: new product technical information
- Fifth common question: WARC band modification

The Big Two: Time and Money

Amateur radio average turnaround time is 5 working days, and the average repair cost for the most common problems is $76.20. The hourly charge for out-of-warranty repairs is $55, with a one-hour minimum charge.

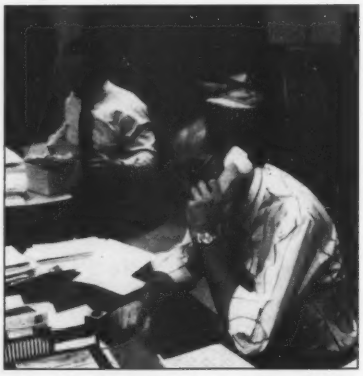

Photo A. Dave Wiegle and Tom Moore KF7GH, Technical Customer Service Supervisor. Gary Fiber KF7XV (not shown) is the customer service phone consultant.

Photo B. ICOM technician repairing a handheld.

Photo C. Good service begins with good test equipment and know-how.

Contacting ICOM for Service

ICOM Headquarters, Washington	(206) 454-7619
ICOM Service, Atlanta, Georgia	(404) 991-6166
ICOM Service, Canada	(604) 273-7400
ICOM Service, Irving, Texas	(214) 550-7525

The most common service problem concerns batteries. The most common problem with incoming equipment is damage in shipping due to poor packaging by the customer.

When ICOM technicians repair equipment that the owner has modified for out-of-band use, they take care not to disturb the modification. However, if the modification is causing the problem, they remove the modification.

The most common errors customers make which result in equipment failure are: using an improper power supply, making improper modifications, and not protecting the equipment from lightning.

During the 90-day warranty period for mobile and HT units, and the 1-year warranty period for HF base stations, there is no charge for parts or labor. Even if you did not send in the warranty card, your unit will be repaired under warranty agreement if you send in proof of purchase.

In some cases, when possible, an extra $25 will expedite repairs in an emergency. Turnaround time for parts orders is one day.

Package It Right, Please!

As noted above, poor packaging by the customer and consequent damage during shipping is a common problem. A bench technician said, "Our client was amazed when we told him his radio had sustained shipping damages—after all, he had carefully wrapped it up in newspaper and sealed it up with nylon tape. . ."

The equipment needs to be WELL-CUSHIONED! Newspaper—even crushed—doesn't work. For further advice, read the section on "Sending In Your Unit" in the Kenwood Corporation Service article in the April issue of *73*. Kenwood also listed poor customer packaging as a common problem.

Be sure to include your phone number with your unit, too. "We hope every ham will include their phone number along with their equipment so we might call them up in case we have a problem duplicating the equipment failure. We recommend that all hams use the *73 Magazine* request form so we know where to contact them during the day and in the evening. We aggressively call hams by phone to further document the problem with the unit they have sent in," says Tom Moore KF7GN.

Before You Call ICOM

Be sure you have this information on hand for the customer service representative: the type of radio, serial number, date of purchase, and place of purchase. If you've already sent your unit off and received acknowledgment, keep the postcard showing your repair tag number and box number nearby.

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FT 790 R/H	31.00	Call $
FT 4700 Dual Ban… Mobile	99.00	Call $
FT 411 2 Meter HT	406.00	Call $
FT 811 440 HT	410.00	Call $

YAESU $ FT-757GX SPECIAL $

ICOM

	LIST	
IC-781 New Deluxe H… Rig	6149.00	Call $
IC-765 Gen. C… Xcv	3149.…	Call $
IC-735 Gen. Cv… cv	…00	Call $
IC-751A Gen. C…	…00	Call $
IC-RZ000 25–13…	…00	Call $
IC-R7…		Call $
IC-228A/H…	…9	Call $
IC-28A/H…		Call $
IC-2G…		Call $
IC-900 SR…		Call $
IC-3S AT 2…	…00	Call $
IC-2S AT…		Call $
IC-4S AT…	…00	Call $
IC-48A FM Mobile 25w	…00	Call $
IC-4GAT New 6w HT	449.95	Call $
IC-38A 25w FM Xcvr	489.00	Call $
IC-32AT 2m/70cm HT	629.95	Call $

SPECIAL $ ICOM 24AT FOR SUMMER $

ALINCO

SPECIAL

DR-570 "The Mini Repeater"

DR-110 T 2M Mobile	519.00	Call $
DR-510 T D/B MBL 2m/70cc	719.00	Call $
DR-570 Dual Band Mobile	759.00	Call $
DJ-100T 3w–2m HT	299.00	Call $
140–150 MHz AMPLIFIERS		
ELH-230G All Mode 30w	95.00	Call $
ELH-230D Pre-amp 30w	113.00	Call $
ELH-260D Pre-amp 50w	175.00	Call $

NOW CANADA

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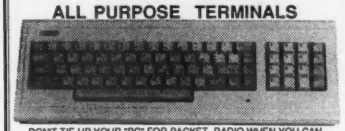
METRO: (612) 786-4475
2663 County Rd. I
Mounds View, MN 55112
Super Minnesota Watts 1-800-279-1503

CIRCLE 332 ON READER SERVICE CARD

PACKET RADIO
ALL PURPOSE TERMINALS



DON'T TIE UP YOUR "PC" FOR PACKET RADIO WHEN YOU CAN DEDICATE OUR *RCA* "APT" to the job. In addition, when not hamming, you can access information services like CompuServe or local bulletin boards with a built in modem.

FEATURES INCLUDE:
Built in Modem, Video or RF Outputs (Allows use of either a monochrome monitor or a TV set), Parallel Printer Port, RS-232 Interface(DB25) for direct connection to PACKET Controller, 40/80 Column, Word Wrap, Acoustical Coupler input, Auto Log-on and more! This terminal originally sold for $500. Our like new APTs are a bargain at

$75 each

When adding an **AEA PK-232MBX** for only $319, we will pay the freight on both items!!!

Owned & operated by Bob Grinnell, WØDTDE

DUST COVERS
BY COVER CRAFT®
= Large selection in stock for most Ham rigs.=
Collins: KWM-2, 32S, 75S, 312B-4 & 5, KWM-380, 30L-1, 51S-1
Drake: R4, T4X, MS4, RV4, SPR4, TR4, MN2000, TR6, L7, L75
ICOM & Kenwood : ALL MODELS STOCKED!
All for one low price..... 8.95 ea

MICROMETALS IRON POWDER TOROID CORES

Prices listed for 1-10pcs.
Deduct 10% for over 10pcs./ item

T5-6	.35	T30-17	"	T50-2	"	T80-52	.80	T225-2B	6.
T12-2	"	T30-52	"	T50-6	.80	T130-0	3.	T300-2	6.
T12-6	"	T37-2	.50	T50-17	.90	T157-2	3.	T300-2D	13.
T25-2	.40	T37-6	.60	T50-52	.70	T157-6	3.	T300-52	8.
T25-6	"	T37-17	"	T68-2	.60	T200-2	3.	T400-2	13.
T25-17	"	T44-2	"	T68-6	"	T200-6	4.	T400-2D	22.
T30-2	"	T44-6	.70	T68-52	.80	T200-52	3.	T400-52	12.
T30-6	.40	T50-0	.80	T80-2	"	T225-2B	6.	T520-2	22.

0 mix – 50 -250 MHz, μo =1 – Phenolic Toroidal Coil Form
2 mix – 0.25 -10 MHz, μo=10 – HF, good for 160 meters especially
6 mix – 2 -30 MHz, μo =8.5 – HF, good thru 10 meters, not below 80
17 mix – 20 -200 MHz, μo =4 – NEW material replaces 12 & 22
26 mix – DC-0.5 MHz, μo =75 – Good EMI/RFI, 822ppm Temp Stability
52 mix – DC-0.5 MHz, μo =75 – Exc! EMI/RFI, 650ppm Temp Stability

FERRITE RODS
1/2" X 8" material 43
Excellent for DC-30 MHz applications
$15 each 4/ $55

TUBE SPECIALS:

3-500Z (EIMAC)	$145	(PENTA)	$110
4-400A (EIMAC)	$189	(PENTA)	$169
4CX1000A (PENTA)	.....		$499
572B (CETRON)	$ 99	(PENTA)	$ 68
811A (PENTA)	$15	(HORIZ. USE)	$ 22
6146B (PENTA)	$15	(MTH PAIR)	$ 38
4CX250B (PENTA)..			$ 95
4CX300A (PENTA) ...			$145
6JB6A,6KV6A,6KM6			$15.50
6LQ6, 6KD6, 6JS6C			$16.50
6LB6, 6MJ6, 12JB6			$17.50

NEW PRODUCTS:

AEA	PK-232MBX All Mode TNC	$319
AEA	PK-88 Packet Controller	$119
AEA	AT-300 300 watt Tuner	$199
AEA	AT-3000 3000 watt Tuner	$369
AEA	FS-430 Fast-Scan Transceiver	$419
B&W	PT-2500 2 x 3-500Z Amplifier	$1725
B&W	VS-1500 1500 watt Tuner	$425
SGC	Automatic SMARTUNER	$499
JACKSON BALL DRIVES, 6:1 ratio		$15
CHIMNEYS, 3-500Z or 4-400		$45

Magnet wire, Vacuum Relays and Capacitors, RF Chokes, Antenna wire and Insulators, RF and Computer Connectors, AMP TYPE1, Oil Caps, Hi-Q Silver wire, Tubes, High Voltage, Multi-Cond. Control Cable, Hardware, Stainless, Brass, Brass, Variable Antennas, ++ More

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OMAHA, NE 68102
402-346-4750
FAX: 402-346-2939

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Enclose $2.50 for UPS on first 3 lbs.
Add 30¢ per lb. up to 70 lb.
Add $3.50 for COD (Cash On Delivery)
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We accept the following items:
Checks: Please include Drivers License # & home add.
Bank Checks, COD, Wire, VISA, MC, AMERICAN EXPRESS

CATALOG 6 here soon. Free with order or SEND $2 ala carte ($5 DX)

SURPLUS SALES OF NEBRASKA
WHERE THE HARD TO FIND PARTS ARE FOUND AND ON HAND

CIRCLE 11 ON READER SERVICE CARD

NEW *COLLINS* PARTS
Why settle for a cheap copy when you can have an *original* ?

- **MANUALS**, Brand new, fresh & crisp !! KWM2/A, 30S-1, 32S-3A, 75A-4 – $39; 75S3B/C, 75S-1, 32S-3 –$32; 75S-3/A, 32S-1, 30L-1– $35; 180S-1, 516F-2–$19; 312B-4/5– $22; 51S-1 –$48; 62S-1 –$65; 32V-3, 75A-3 –$95; HF-380 (operations)–$20; 651S-1 – $165, 136A-1(blanker)–$20; Photo copies: HF-380, KWM-380(service)– $99; 51M-10/10A or 51M-11 –$160; PM-2 –$5; MP-1, 516E-2 – $30; R-390A, 55G-1 –$75; 32V-1,2 or 3 – $65; 51J-2, 3 or 4 –$50; 62S-1, 75A-1 or 3 –$49; 399B-4 or 5, 399C-1 –$15; 671B-1 –$95; 789T-1 –$140
- **Extension for front feet,** Aluminum, tapered, beveled, black; tilts rig. $8ea 6/ $42
- **Paint** S-Line trim ring #126, cabinet #180, front panel #250. St James Gray # 270 & KWM-380 cabinet, all 12oz spray can or KWM-380 colors, 1/2pt. can $12.
- **Power Cords:** 51S-1 $21.95, 75B- $16.95, 516F-2 hi volt intercon. $36.95
- **Crystals:** All frequencies in stock(CP-1) $8each, 5 or more crystals only $ 7
- **Crystals:** BFO (456.350, 453.650 & 455.8 KHz)– $35; 100KHz calibrator – $42
- **KWM-2A** plug-in relays 970-2439-010 (X96) or 970-2439-020 (X97) $49.95
- **KWM-2A RELAY** Modification kit converts open frame to plug-ins (above) $129 ****** Includes Collins instructions, relays, sockets, bracket and misc parts******
- TR relay for KWM-2, 32S or 30L-1 , Potter&Brumfield **KR-2565-1** $ 50
- **PANEL METERS** *(new)* for most Collins' gear. YOUR CHOICE $85
- **Mechanical Filters** S-LineCW: 526-9494-00 • F455FA-05 • 500Hz $259 **75A-4 – 526-9091-00 • 455.650 • 6 KHz $475 or 526-9154-00 • 455J5 • $575
- **Oak Switches** 259-1075-00 (KWM-2/A) $69.95. 259-0949-00 (75S-) $49.95 10070-4 on/off "AC" end switch for rotary switch repair on KWM-2 & 32S- $ 19
- **Pots:** 376-7404-00 (KWM-2/32S mic gain)–$29; 376-2151-00 (75S-3 AF/RF)–$32
- **KWM-380 to HF-380 Conversion Kits.** Includes A3 Lowpass Filter, Oscillator/Oven, "060" ROM & "HF-380" **Emblem**, plus instructions. $500
- MM-280 Mobile Mike $35; AC-2830 Headset $ 45; AC-282B Footswitch $39
- KWM380 Speech Processor, factory sealed, AC-3802 $350
- 380Filter **New Prices:** 140Hz-$199; 350Hz-$149; 1.7KHz-$139; 6 KHz- $99
- **COLLINS EQUIPMENT ON HAND:** 51J-5, 75A-4, 32S-1, 32S-3, 75S-1, 75S-2, 75S-3, 75S-3B, 75S-3C, KWM-2, KWM-2A, 30L-1, 399C-1, 302C-3, KWM-380.

CIRCLE 11 ON READER SERVICE CARD

"GUARANTEED TO OUTPERFORM"
THE .....OR YOUR MONEY BACK!

HAM 10™ TEN METER HAM ANTENNA

CUT-AWAY VIEW OF THE HAM 10

The "Ham 10" ten meter antenna is designed and manufactured by American Antenna, makers of the world famous K40 Antenna. With a power handling capacity of 1500 watts and a band width of 1.5 mhz between 2:1 SWR points the "HAM 10" is the perfect compliment to all single-band ten meter rigs. The stainless steel base of the 'HAM 10" is supplied with an adjustable trunk lip mount. Also available is an optional adaptable heavy duty magnamount.

EXCLUSIVE FEATURES:
① HANDLES UP TO 1500 WATTS!
② METALPLAS CONSTRUCTION.
③ 30° ROTATION OF BASE.
④ STAINLESS STEEL WHIP AND BASE.
⑤ MOUNTS ANYWHERE ON ANY VEHICLE!
⑥ FULLY ASSEMBLED WITH 18' of RG-58 COAX.
⑦ COMPUTER DESIGNED ISOLATION CHAMBER.

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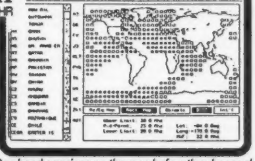
CIRCLE 92 ON READER SERVICE CARD

DX Helper *II*
Macintosh Software W7HR
MUF Map • MUF Plot
Gray Line • Great Circle
Prefix, Zone, Oblast
WWV Alert • CW Drill
$49.95 ppd Info $1
AntennasWest
Box 50082-F, Provo, UT 84605
1-800-926-7373



See band openings on the map before they happen!

CIRCLE 90 ON READER SERVICE CARD

THIS MONTH'S GOODIE FROM THE CANDY STORE

RDC

ICOM IC-726 UNDER $1100.00

Similar Savings On Kenwood, Astron, Yaesu, Hy-Gain, Alinco, Etc All L.T.O.
Icom IC-471A $709.90
Over 9008 Ham Items In Stock, All Prices Cash FOB Preston
More Specials in HAM-ADS. Looking For Something Not Listed?
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CIRCLE 254 ON READER SERVICE CARD

The performance of your system depends upon the antenna it drives.

Drive A Winner – Hustler.

Yes, please send information on your line of amateur antennas to:

NAME _____

ADDRESS _____

CITY STATE ZIP

HUSTLER®

One Newtronics Place
Mineral Wells, Texas 76067
(817) 325-1386

CIRCLE 269 ON READER SERVICE CARD

Eric Heineman, of Support Marketing Groups, is the ICOM service manager at headquarters in Bellevue, Washington. Tom Moore KF7GH, Technical Customer Service Supervisor, is the key person in service personnel. Rick Young KC7PC is the Bellevue service supervisor. Kimberly Cottongim supervises the service parts department.

It isn't necessary to have your dealer look at a defective radio before you send it to ICOM. Also, you don't have to notify ICOM before sending your equipment in, and you don't have to call ahead for a return authorization.

Inside the Service Department

Twelve technicians at ICOM headquarters in Washington State have been trained to repair microprocessor units, circuit boards, VFOs, and other equipment. The other service centers have three technicians each. All service centers are located near airports for quick turnaround time. No radio ever goes back to Japan to be fixed!

ICOM's service and marketing personnel exhibited a positive attitude toward customers and clients. At ICOM, regardless of how the problem occurred, the customer is king.

The ICOM service crew shares the exasperation of repeat service problems. One of the service supervisors said, "When a radio comes back for the second time with the same problem, it goes to the head of the line, and we may even begin replacing strategic components . . . Our technicians take a repeat failure personally—after all, it shows up on their month-end service evaluations, and they are hams, too . . ." In the beginning of 1990, ICOM was receiving approximately 550 repairs per week. The computer indicated that less than 0.8% came back for a repeat failure fix.

The bench technicians were quick to point out that some repeat failures might be attributed to problems on the airwaves, not within the unit. Case in point—a handheld that came back for the reception of out-of-band signals. When the customer service department phoned the customer, they discovered that the unit was tied into a rooftop high-gain antenna system, surrounded by twenty rooftop repeaters! It was no wonder that the handheld was picking up intermod or experiencing severe desensitization. Rather than an equipment failure, this was an operational error of using a piece of gear in an unsuitable environment. A handheld transceiver cannot reject out-of-band signals when tied into a high gain antenna and operated at a repeater location.

Listening in on the ICOM customer service lines, it was clear to me that ICOM personnel encourage hams to discover the cause of their problems in the field, if possible, so that they don't have to send their units in.

I asked ICOM technicians about the lithium battery scare we all heard about a few years ago. Will all ICOM lithium batteries go dead after a few more years of use? A bench technician responded, "The lithium batteries will probably outlast the equipment. We expect a base station to go for 15 years before the battery needs replacing. On handhelds, 7 years is the minimum—but we expect those lithium batteries to carry on for twice that amount of time." Soon you will be seeing articles about how to change lithium batteries without dumping the memory on your sets, but for now, ICOM is not worried about their lithium batteries going bad.

ICOM maintains a boneyard of dead, unrepairable radios. "On some very old ICOM sets, we may use this stockpile of equipment for parts no longer made," says a technician who routinely works on older sets. An eager, young Japanese technician said, "Just the other day at a hamfest, I spent $5 for an old ICOM set so I could scavenge the channel selector plate off the front of the radio for a repair I had in the shop." He didn't mind spending his own five bucks to take care of his client.

ICOM uses the latest in service equipment. They also have NiCd battery "checker exercisers," a "bake and shake" table, a "deep freeze" for troubleshooting radios that quit in the cold, and "life-test jigs" that continuously monitor the performance of a transceiver with a possible intermittent.

Reader Response

Bob WB6TKM "...sent in an old IC-720—dead as a doornail. Got it back 6 weeks later, looking like new, and a note of explanation on why the delay—they had to wait for a transplant to replace something on the inside. ICOM postcards kept me up-to-date—great service."

Leroy Smith's IC-740 encountered reoccurring problems and states, "I don't believe the American techs are on a par with Japanese techs." He further indicated that certain ICOM intermittent failures should be recognized by the company that has thousands of sets out there with possibly the same problem.

Mike KC1CS says, "Four-week turnaround on an ICOM 751A. They added all factory mods, and tuned up everything. They did a great job."

Larry WN8P says, "I found that the service manual schematics did not follow the actual equipment on the IC-551. Labels for boards and schematics were different. ICOM acknowledged the problem with certain waveform pictures, but I have yet to receive an up-to-date manual. In general I have found that schematic diagrams and parts lists of all manufacturers, such as ICOM, Kenwood, Heath, etc., do not follow IEEE standards. Heath's use of the block numbering system has been out since at least 1975."

Bill KA2OVR says, "We lost out as a manufacturing nation, but as a service nation, we are more negative than negative. Yaesu and ICOM are for the birds. Ten-Tec continues to be our shining star."

Happy to say, 38 more letters came in the mail, mostly positive regarding ICOM service. It's a real pro show. "Service is good business for ICOM," says Mark Allen, who now works entirely in marine communications. "No one can beat our service." 73

INTRODUCING OUR NEW COMPUTER-CONTROLLED

REP-200 REPEATER

If you always thought a computer-controlled repeater had to be expensive, LOOK AGAIN! You could easily spend this much just for a controller.

As always, Hamtronics strives to give *superb performance* at *modest cost!* In this case, a premium repeater with versatile computer control, autopatch, and many dtmf control features at *less than many charge for a bare-bones repeater!*

We don't skimp on rf modules, either! Check the features on R144 Receiver, for instance. GaAs FET front-end, helical resonators, sharp crystal filters, hysteresis squelch.

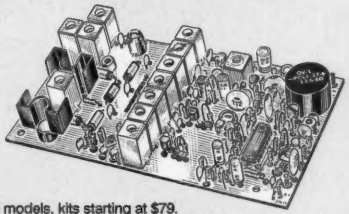
We completely re-thought the whole idea of what a repeater should be, to give the *best features* at the *lowest cost.*

ONLY $1295!

- Available for the 10M, 6M, 2M, 220MHz, 440MHz, 902MHz ham bands. ***FCC type accepted** models also available for vhf and uhf commercial bands.*
- **Rugged exciter and PA**, designed for continuous duty.
- Power output 15-18W (25W option) on 2M or hi-band; 15W on 220MHz; 10W on uhf or 902MHz.
- Accessory add-on PA's available with **power levels up to 100W.**
- **Five courtesy beep types**, including a pleasant multi-tone sequence.
- **AUTOPATCH**: either **open or closed** access, **toll-call restrict**, auto-disconnect.
- **Reverse Autopatch**, two types: auto-answer or ring tone on the air.
- **DTMF CONTROL**: over 45 functions can be controlled by touch-tone. Separate 4-digit control code for each function, plus extra **4-digit owner password.**
- **Owner can inhibit** autopatch or repeater, enable either open- or closed-access for repeater or autopatch, and enable toll calls, reverse patch, kerchunk filter, site alarm, aux rcvr, and other options, including two auxiliary external circuits.
- The cwid message, dtmf command codes, and owner-specified default parameters for cor and cwid timers and tones are burned into the eprom at the factory.
- Cw speed and tone, courtesy beep and tail timers, and courtesy beep type **can all be changed at any time** by owner-password-protected dtmf commands.
- Many **built-in diagnostic** & testing functions using microprocessor.
- Color coded led's **indicate status** of all major functions.
- **Welded partitions** for exciter, pa, receiver, and controller. PEM nuts for covers.
- 3-1/2 inch aluminum rack panel, finished in eggshell white and black.
- **Auxiliary receiver input** for independent control or **cross linking repeaters.**

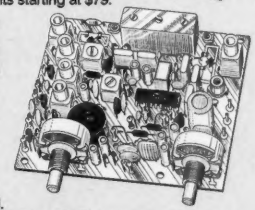
There are many other features, too numerous to mention. Request catalog for full details.

HIGH PERFORMANCE XMTRS & RCVRS FOR REPEATERS, AF & DIGITAL LINKS, TELEMETRY, ETC.



FM EXCITERS: kits $99, w/t $169. 2W continuous duty. TCXO & xtal oven options available. *FCC type accepted for com'l uhf & hi bands.*

- **TA51** for 10M, 6M, 2M, 150-174, 220MHz.
- **TA451** for uhf.
- **TA901** for 902-928MHz, 0.5W out (w/t only, $169).
- **VHF & UHF AMPLIFIERS.** For fm, ssb, atv. Output from 10W to 100W. Several models, kits starting at $79.



FM RECEIVERS: kits $139, w/t $189.

- **R144/R220 FM RECEIVERS** for 2M, 150-174, or 220MHz. **GaAs FET** front end, 0.15uV sensitivity! Both crystal & ceramic if filters plus **helical resonator** front end for exceptional selectivity: >100dB at ±12kHz (best available anywhere!) Flutter-proof hysteresis squelch; afc tracks drift.
- **R451 UHF FM RCVR,** similar to above
- **R901 902-928MHz FM RCVR.** Triple-conversion, GaAs FET front end.
- **R76 ECONOMY FM RCVR** for 10M, 6M, 2M, 220MHz, w/o helical res. or afc. Kits $129.
- **Weather satellite & AM aircraft rcvrs** also available.

If you prefer a plain-vanilla or kit repeater, you couldn't find a better value than our original

REP-100 REPEATER

Same fine rf modules as REP-200 but with COR-4 Controller. Can add autopatch, dtmf decoder, CTCSS, either now or later. **Kit only $675, w/t $975.**

ACCESSORIES

COR-3 REPEATER CONTROLLER kit. Features adjustable tail & time-out timers, solid-state relay, courtesy beep, and local speaker amplifier $49

CWID kit. Diode programmed any time in the field, adjustable tone, speed, and timer, to go with COR-3 ..... $59

***NEW* COR-4** kit. Complete COR and CWID all on one board for easy construction. CMOS logic for low power consumption. Many new features. EPROM programmed; specify call .. $99

***NEW* TD-3 SUBAUDIBLE TONE DECODER/ENCODER** kit. Adjustable for any tone. Designed **especially for repeaters,** with remote control activate/deactivate provisions $24

TD-2 TOUCH-TONE DECODER/CONTROLLER kit. Full 16 digits, with toll-call restrictor, programmable. Can turn 5 functions on/off. Great for selective calling, too! $79

AP-3 AUTOPATCH kit. Use with above for repeater autopatch. Reverse patch & phone line remote control are std . $79

AP-2 SIMPLEX AUTOPATCH Timing Board kit. Use with above for simplex operation using a transceiver $39

MO-202 FSK DATA MODULATOR kit. Run up to 1200 baud digital signals through any fm transmitter with full handshakes. Radio link computers, telemetry gear, etc. $39

DE-202 FSK DEMODULATOR kit. For receive end of link. $39

9600 BAUD DIGITAL RF LINKS. Low-cost packet networking system, consisting of new MO-96 Modem and special versions of our 220 or 450 mHz FM Transmitters and Receivers. Interface directly with most TNC's. Fast, diode-switched PA's output 15 or 50W. *Call for more info on the right system for your application!*

GaAs FET PREAMPS

at a fraction of the cost of comparable units!

LNG-(*)

***ONLY* $59** wired/tested

FEATURES:

- **Very low noise:** 0.7dB vhf, 0.8dB uhf
- **High gain:** 13-20dB, depends on freq
- **Wide dynamic range** - resist overload
- **Stable:** low-feedback dual-gate FET

**Specify tuning range: 26-30, 46-56, 137-150, 150-172, 210-230, 400-470, or 800-960 MHz.*

LNW-(*) MINIATURE GaAs FET PREAMP

***ONLY* $24**/kit, **$39** wired/tested

- GaAs FET Preamp similar to LNG, except designed for **low cost & small size.** Only 5/8"W x 1-5/8"L x 3/4"H. Easily mounts in many radios.

**Specify tuning range: 25-35, 35-55, 55-90, 90-120, 120-150, 150-200, 200-270, or 400-500 MHz.*

LNS-(*) IN-LINE PREAMP

***ONLY* $79**/kit, **$99** wired/tested

- GaAs FET Preamp with features similar to LNG series, except **automatically switches out of line during transmit.** Use with base or mobile transceivers up to 25W. Tower mounting brackets incl.

**Specify tuning range: 120-175, 200-240, or 400-500 MHz.*

HELICAL RESONATOR PREAMPS

Preamps with 3 or 4 section helical resonators **reduce intermod & cross-band interference** in critical applications. **MODEL HRA-(*)**, $49 vhf, $94 uhf.

**Specify tuning range: 142-150, 150-162, 162-174, 213-233, 420-450, 450-470.*

RECEIVING CONVERTERS

Low noise converters to **receive vhf and uhf bands on a 10M receiver.** Choice of kit with case & BNC jacks, kit with pcb only, or w/t unit in a case. Other models available for other in/out ranges & atv. *Request catalog for complete listings.*

VHF input ranges avail: 136-138, 144-148, 145-147, 146-148, 220-222, 222-224; kit less case $39, kit w/case $59, w/t in case $89.

UHF input ranges avail: 432-434, 435-437; kit less case $49, kit w/case $69, w/t in case $99.

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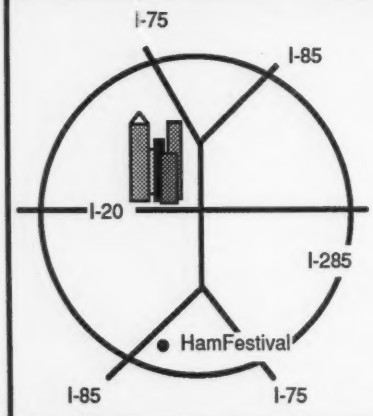

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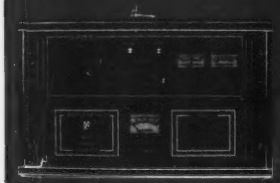

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Backward Inverted L Antenna

This low-band wire antenna is a good performer on both transmit and receive.

by Stan Gibilisco W1GV

In the March 1988 issue of *QST*, Doug DeMaw W1FB points out that closed loops have advantages for reception because they are less responsive to noise than open loops or dipoles. His design provides vertical polarization for low-angle radiation, another good feature for low-band DX operation. After experimenting with balloon-supported antennas and longwires at 1.8 and 3.5 MHz (see "Balloon Supported Antennas" in the September '88 issue of *73*), I wanted to try something that would last and have better noise immunity than previous antennas.

DeMaw's design has the high-current part of the antenna vertically polarized near the station (although some of the high-current portion is horizontal), and this apparently is the reason for the low angle of radiation and response. A quite popular antenna for 160 and 80 meters is the inverted L, also having this characteristic (see Figure 1a) when the length is ¼-wavelength. Ideally, the inverted L would be ½-wavelength with ¼-wave going up and ¼-wave going horizontally at a height of ¼-wavelength above ground (Figure 1b), but this is not always possible because of space limitations. I have neither the resources nor the kind of neighbors who would enjoy looking at a 125-foot vertical structure.

The typical inverted L would probably have poor noise characteristics because of its broad bandwidth, vertical polarization, and the fact that it is not a closed loop. The "balloon verticals" provided good evidence of the kind of noise reception that can occur at 1.8 MHz with large, vertically polarized antennas, and I was ready to try some other design, at least for receiving. Alas—a ⅝-wave balloon vertical puts out a whopping state-side signal at 1.8 MHz!

Terrain Considerations

The house here is on a hill and there is plenty of room for antennas out back, although the terrain slopes downward starting at about 200 feet from the back door. There are plenty of trees about 50 feet high, both on the hill and on the flat below the downslope. Getting an antenna up high above the ground is difficult near the house, but easy some distance away. Any vertical portion of an antenna would have to be located far away from the house. How would I get a high-current loop near the far end of the antenna? One answer was to ground the far end, rather than leaving it free, as is the usual practice.

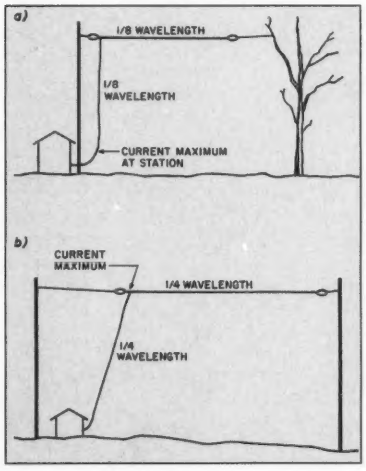


Figure 1. Inverted L antennas cut a) for quarter-wave; and at b), half-wave. The half-wave design has the current loop at a good elevation, and also has high feedpoint resistance, both desirable features for end-fed antennas.

There is nothing that says the far end of an antenna must be a free end. When this is the case, a voltage maximum and current minimum are found there. Grounding the end of the antenna causes this situation to be reversed. The ground should be a low-loss ground for RF. This means there should be numerous radials, not just a ground rod. This presented no problem at my location; there was tall grass and shrubbery all around in the vacant lots adjacent to the house, so no one would be likely to trip on radial wires laid at the surface.

I chose a tree about 100 feet to the north of the house for securing the far end of the antenna. This tree was just slightly below the level of the house and about 50 feet high. A support just 35 feet tall would result in a horizontal span of wire from the house to the top of the tree. This scheme is shown in Figure 2. The antenna is about 45 feet from the rig to the top of the support, 100 feet from the top of the support to the treetop, and 45 feet to the grounded far end, for a total of 190 feet. Since I have a wide-range antenna tuner, I was not especially concerned about the impedance at the feedpoint.

The antenna was easy to install, the support near the house being made from aluminum tubing and the rest of the antenna from A.W.G. No. 15 aluminum electric fence wire. The ground was made using a short iron stake (I've heard copper kills trees). This provided a mechanical anchor. The actual RF ground was made using the aluminum wire, which sells for $13.49 per quarter mile. I installed 12 radials, each 125 feet long, representing ¼-wavelength at 160 meters. I had to bend and cut some of the radials short because of the yard getting in the way (see Figure 3, top view of Inverted-L system). The radials were arranged at angles as nearly equal as possible.

A Little Theory

This antenna, about 195 feet long, is not resonant at any amateur frequency except perhaps 30 and 15 meters, and also somewhere in the 10 meter band. I was not concerned about resonance. However, since the far end of the antenna is at a current loop, it would be expected that if the antenna were operated at the frequency where it is ½-wavelength or any multiple thereof, the input impedance would be fairly low and purely resistive. For example, a 132-foot antenna would be resonant at 80 meters, and also at all of the harmonic bands.

Since the well-grounded (RF) far end is always a high-current point, there will always be good low-angle vertically polarized radiation and response, no matter what the frequency, as long as the vertical section is fairly long (say, 0.1-wavelength or more). This can be qualified if the frequency is so high that the vertical section measures more than about ⅝-wavelength; the radiation angle would be raised in this case. This might be of some concern at 28 MHz and perhaps at 21 MHz as well. I had the lower bands—160, 80 and 40 meters—in mind when I conceived this antenna.

Station Grounding

A good ground system at the station is an

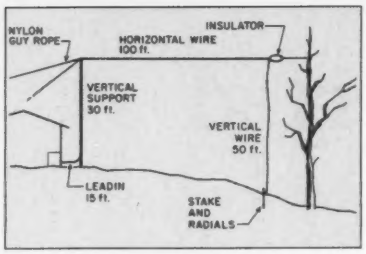


Figure 2. The "backward inverted L" or "inverted U." Note that the far end is grounded, ensuring a current maximum along a vertically polarized part of the antenna. (Radials not shown.)

advantage, even though the feedpoint may not occur at a current loop. The situation is essentially the same for this antenna as it would be for any end-fed, multiband antenna. I don't have a permanent radial system at the station, since burying a kilometer of wire is a true chore, and kids, lawn mowers, etc. tear up radials laying on the surface. (In the winter, if there is enough snow, you can lay them under the snow pack.)

Fortunately, there is a cold-water pipe running through the wall right behind the transmitter, and there is a removable piece of wall plaster that exposes the pipe for direct connection. This is pure coincidence, as I did not even realize this existed when I chose the transmitter location. Did Murphy miss one? Likely not—there was some evidence of RF in the shack at some frequencies even with this copper pipe tied directly to the radio with heavy braid, a sign that plumbers may have installed lengths of non-conducting PVC pipe. You cannot take a good RF ground for granted. Ideally there should be several ¼-wave (or longer) radials emanating from the station.

The horizontal span would provide high-angle radiation and response at all frequencies, making this antenna very similar to the inverted L, except that the main vertical portion would be at some distance from the shack rather than adjacent to the shack.

The antenna described here closely resembles DeMaw's loop, except that the low horizontal part is missing. The equivalent circuit is essentially the same, however, and I expected that the results would be similar to those described in DeMaw's article. I tuned the antenna using my transmatch and logged

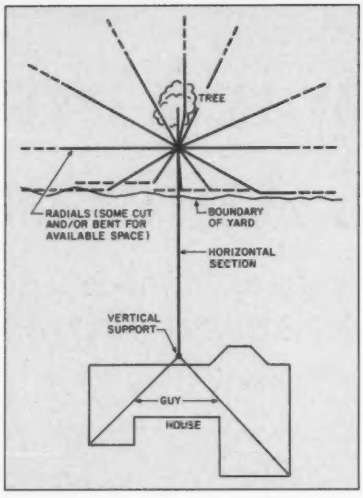


Figure 3. View of W1GV "backward inverted L" from above. Note how radials were bent and/or cut to fit within the available space.

all the settings for future reference, and awaited the early morning VKs and ZLs, as winter still had not given way to the QRN of warmer months at 1.8 and 3.5 MHz.

Performance

I received good signal reports on 160 and 80 meters using 75 to 100 watts CW output. This antenna could not compete with past experimental balloon verticals and "kite slopers" for transmitting, but the received noise level was much lower than it had been using the 880-foot longwire, and was certainly well below that received on the gigantic sky hooks.

Radiation Patterns

The inverted backward L wasn't rigorously tested for directionality. I received good reports from all over the continental US and Canada—there didn't seem to be any real "weak spots." I expect more thorough tests, however, to reveal that the backward inverted L radiates similar to a loop, since the actual antenna and its image form a loop with a circumference of about 390 feet, yielding almost a full wavelength circumference at 1.8 MHz. (See Figure 4.) This "loop's" plane is vertical, so the radiation patterns are expected to be horizontal and normal to the plane of the loop.

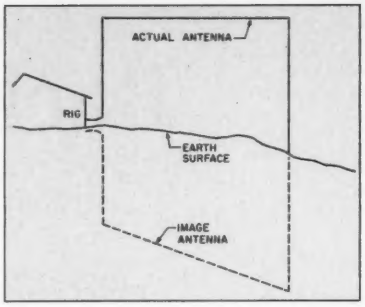


Figure 4. Diagram of actual antenna and image antenna, showing the equivalent vertical-plane loop that results from the combination.

I had no trouble hearing Europe in the evenings and Japan in the early mornings at 3.5 MHz, but have not yet heard those loud VKs and ZLs on 160. There doesn't seem to be much compliance with the idea that 1.825–1.830 MHz is DX only for transmitting.

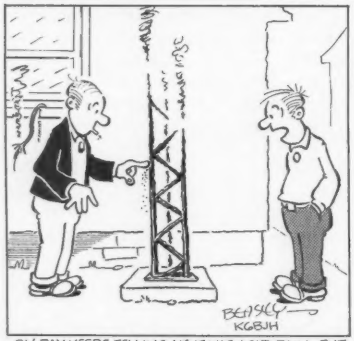
Although I have heard that loops and their equivalents (such as this antenna) may be susceptible to intermodulation from broadcast stations in the standard AM band, I have had no trouble with this. I am lucky not to be near stations in the 900–1000 kHz range, where second harmonics might be heard.

Good TX/RX Compromise

Little, of course, can beat the transmit capabilities of the balloon vertical or kite sloper, but it certainly holds its own, and is much better on receive. An ideal fixed wire system would be the inverted backward L for transmit, and a system of beverage antennas for receive, if the beverages are properly installed and matched for impedance. (Beverages outperform the "L" on receive.) The "L" also has the advantage of being grounded all the time for DC, so that when the station end is disconnected, electrical charges are drawn away from the house. That's peace of mind when those big, black thunderstorms start rolling in from the Midwestern prairie.

If you've got the space, I recommend the backward inverted "L." It's one of the better single transmit/receive wire antennas going for the low bands! 73

Stan Gibilisco W1GV can be reached at 871 S. Cleveland Ave., St. Paul, MN 55116.



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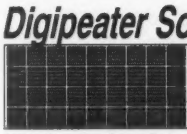

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10 Meter Packet

In an earlier column I suggested that 800 Hz shift AFSK into an SSB transceiver might be just the ticket for 10 meter packet radio. I also suggested that 10 meters would be a good band for 1,200 baud packet, since the radios are inexpensive and Novices could operate there, too. Therefore, I reasoned, 10 meter packet was an attractive alternative to 2 meter packet operation at 1,200 baud. Sure of this, I purchased a Uniden HR-2600 transceiver for 10 meter packet experimentation.

My biggest concern was that the HR-2600 be able to pass a 1,200 baud signal without excessive distortion. It turned out that my fears were unfounded. In fact, if you compare the frequency response curves (see the figure) for the HR-2600 with the response curves for the 2m radios I evaluated about a year and a half ago, the HR-2600 stands up very well indeed.

I used a simple technique to measure the frequency response of the HR-2600. I connected an audio signal generator to the MIC jack and measured the power output into a dummy load. Since an SSB transmitter is a linear device (at least it is supposed to be) the power output should be proportional to the signal level at the MIC input. The only variation from this should be a function of any AF or IF filtering inside the rig.

I took measurements for both upper sideband (USB) and lower sideband (LSB) so that I could determine which had a flatter passband. See the figure for a graph of the audio frequency vs. relative RF output. I drove the rig to a nominal 10 watts output with a 1 kHz tone. The dB measurements are relative to that reference level.

As you can see, the HR-2600 is quite flat from about 600 Hz to about 4,300 Hz. This provides a bandwidth of 3.7 kHz, more than adequate for 1,200 baud. The 1,200 baud signal (Bell 202 modem) spans from about 600 Hz to about 2,800 Hz. This will fit quite nicely in the passband of the HR-2600. Considering that you can find the HR-2600 advertised in *73* for $219, this is quite a deal. You can't even buy a new 2m handie-talkie for that.

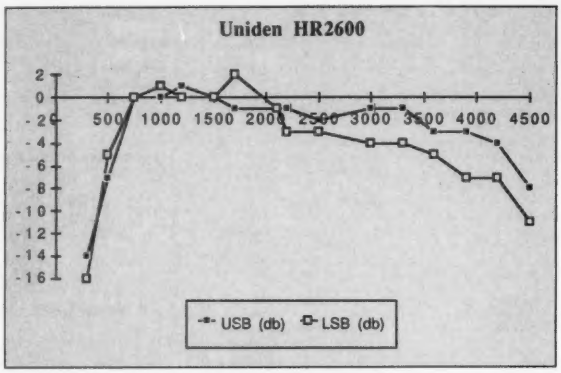

Figure. HR-2600 frequency response curve.

There is a drawback to the HR-2600: Its filter is quite broad, letting a lot of QRM in, if there is any about. This can raise havoc with the ability to receive packets if the QRM activates the AGC in the receiver.

Filters and TNCs

What about other transceivers? Well, you can use one of those expensive brands (hi), but their filters may cause you some problems. Most HF rigs nowadays have pretty respectable filters. These are usually somewhere between 2.1 kHz and 2.5 kHz wide with very steep skirts. The signal from the modem in a TNC running at 1,200 bauds with 1,000 Hz shift is about 2.2 kHz wide. This may not work with all filters in all radios.

If you have trouble copying packets, or others have trouble copying your packets, try running your modem in V.23 mode. Almost all TNCs can do this. With a Kantronics TNC it is a simple command (CCITT On). With others it is usually a simple adjustment. With a TNC-2 clone like the MFJ-1270 or 1274, simply recalibrate the transmit tones to 1,300 Hz and 2,100 Hz instead of 1,200 Hz and 2,200 Hz. If you have a TNC that uses the AMD7910 or the TMS3105 modem chips, you can make a very simple modification to make them operate in V.23 mode.

There is one fly in this ointment; most TNCs have carrier detect circuits that will not work very well (actually, most won't work at all) with an SSB radio. Why? Because they sense the noise and interpret it as signal. You could try the squelch with your radio (if it has one), but if your experience with squelches on SSB radios is anything like mine, you will give that up quickly. They just do not work well enough for packet radio.

If you plan to operate on 10 meters (or with any SSB radio on any band for that matter) it is a good idea to purchase and install the TAPR DCD modification kit (you don't need this modification with the MFJ-1278 since it already has it built-in). Which kit you get is a function of the type of modem in your TNC. If you have a TNC-2 or clone with a 2211 demodulator, you need the kit for the TNC-2. If you have something with a 7910 or a 3105 you will need the DCD modification that detects the carrier by detecting valid data in the data stream. Contact TAPR for more information on these kits.

Once you have everything hooked up, set the output level from your TNC so that it gives you about 70% of maximum output from your rig. This should keep the PA operating within its ratings. This also helps keep you in the linear operating region of the radio.

Packet on LSB or USB

Many people will tell you that you must use LSB for operating packet. While true for RTTY, this is NOT true for packet. You may use either USB or LSB. The only difference is in the tuning.

With a USB signal, the audio tones generate a signal above the carrier frequency, while with LSB the modulating tones generate a signal below the carrier. If you consider the center of the modem signal to be 1,700 Hz (halfway between the 1,200/2,200 or 1,300/2,100 Hz tone pairs) then you can figure out where your signal is. If you want your signal to be on 28.190 MHz and your radio is set for USB, you would set the transmit frequency to 28.188.3 MHz, 1.7 kHz lower than the desired frequency for your signal. If you are using LSB, you would set your transmit frequency to 28.191.7 MHz. That is all there is to it.

If you want 1,200 baud packet activity on 10 meters, look around 28.190 MHz. There seems to be a good deal of activity around there. I also recommend using 10 meter packet for local operation. If you are going to do local operation, pick a frequency that is not generally used for DX. I would try around 28.180 MHz or a little lower.

Remember that Novices can be a big part of your local packet operation if you give them a way to get on the network. Add a BBS or a switch (NET/ROM or otherwise) so that the Novices can reach the other users on 2 meters and above.

Well, try it and let me know how it works. Perhaps I will get a chance to work you there. 73

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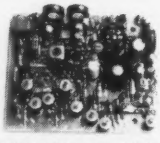

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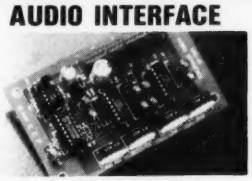

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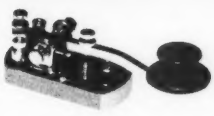

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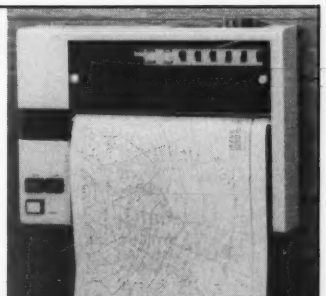

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HOMING IN

Radio Direction Finding

Joe Moell, PE, KØOV
PO Box 2508
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Jammer Busting

We hams are self-policing, right? You have read and heard about this since you began studying for your license. But if you've listened to recent emergency nets, you may have heard some things that made you think that our Self-Police were on strike. What gives? Have we lost control of our bands?

It's true that we hams have always tried to rectify technical and operating violations by ourselves. In a local ham's estate, I found an ARRL Official Observer (OO) notice over 60 years old! But the venerable OO program worked in the past only because hams were self-disciplined, and friendly persuasion was all it took to cure most problems. That's not as true today as it was a generation ago.

In 1982 a Congressional committee report praised amateur radio's "...tradition as the most self-regulated radio service in the United States." The report continued, "Less time has been devoted to monitoring and regulating the Amateur Service than to any other service because of its self-policing and discipline."

FCC Fades Away

Our reputation as "good guys" means that FCC enforcement people have been able to ignore us and concentrate on other spectrum users. This has gone on for so long, and the FCC's budget is now so tight, that when serious problems crop up, it's hard to get FCC help. The manpower is no longer available.

Keep in mind that most rule violations occur on weekends and at night, when our bands are most active. As often as not, the FCC's efforts to catch serious offenders must be done during off-hours, on their own time. On the other hand, hams usually have their best opportunities to patrol the bands and go transmitter hunting on their off-hours. So it's to everyone's benefit for volunteer hams to be allowed to gather evidence for proceedings against serious violators.

Congress and the FCC were confident of our ability to do this, so one of the provisions of the Communications Amendments Act of 1982 (better known as Public Law 97-259) authorized the FCC to form an Amateur Auxiliary (AA). The Congressional committee was excited that ham band policing could be done with "even less expenditure of government time and effort than in the past," to quote the report.

The combined OO/AA program (sometimes collectively called Voluntary Monitoring or VOLMON) has been very successful in some areas, but it needs much more participation. For rapid response to jamming on the DX bands, the Auxiliary needs transmitter hunters in every part of the country. Wouldn't it be great if each ham club had at least one member skilled at mobile Radio Direction Finding (RDF) on both HF and VHF?

For the last two months, "Homing In" has featured equipment we can use to help ourselves and the FCC by performing mobile RDF to locate jammers, intruders, bootleggers, and man-made noise. RDF gear is easy to build and can be used for competitive foxhunts as well as for more serious purposes.

VOLMON Builds Cases

As I talk to ham clubs and individuals, I realize that there are many misconceptions about what it takes to keep the bands clean. One incorrect assumption is that hams are self-enforcing. It's not true. Only the FCC can legally do enforcement.

Volunteer monitors scan the bands, using postcard OO notices and friendly reminders on hams with equipment problems or who momentarily forget the rules. But they don't prosecute offenders or mete out punishment. Public Law 97-259 didn't make us self-enforcing, but it did allow us to begin to work directly with the FCC, gathering evidence that the FCC can use to enforce its mandate.

The goal is for VOLMON-to-FCC contact to be a rare occurrence. VOLMON seeks to solve minor rule violations and amateur-to-amateur disputes entirely on its own, using reminders, persuasion, and negotiation as needed. FCC assistance should only be invoked in serious cases of Part 97 rule violations, and only after VOLMON has tried everything else to resolve the problem.

Sometimes FCC staffers want us to obtain all the evidence against a serious offender. In other situations, they want to do it themselves. It's up to the FCC to decide in each case.

Larry Guy, head of the Los Angeles Field Office, is typical of FCC field officials. He says, "I will not take a case until the Amateur Auxiliary has thoroughly worked it, documented it, and done everything possible within its charter to resolve the problem."

Documenting a hard-core jamming case doesn't mean simply accumulating a pile of copies of OO notices you have mailed out. It's not enough to make tape recordings from various base stations.

Only firsthand evidence is acceptable. The evidence must clearly point to the suspects. Just because you hear W6XYZ's callsign on a transmission doesn't mean W6XYZ made the transmission. There have been attempts to frame hams by playing tape recordings and using false callsigns.

Proper documentation means going mobile with RDF gear, tracking down the exact location of the suspect, charting the bearings, and correlating them with the contents of the transmission. You must be able to prove beyond reasonable doubt that the station you hunted down is the one causing the problem. All this data must be in a form that is easily understood by the FCC, the US Attorney, and perhaps a jury.

Larry Guy says, "This is the same type of thing we do when we take a case to the US Attorney. They want to look at the map; they want to see where our vehicle was and where the bearings met. They want to know if there were any other antennas in the area that could have been the source. We must also show them that all Auxiliary remedies have been exhausted."

These procedures may seem strict and arduous, but they're the same procedures that FCC engineers must follow when they build their own cases. If you were going to small claims court to get a monetary judgment, you'd gather and prepare every possible bit of evidence and documentation to increase your chances of winning. It's the same way with a jammer case.

Jammers Beware

It sounds like KØOV is giving aid and comfort to troublemakers by telling what it takes to prosecute them, doesn't it? Well, the hard-core jammers know all this already. Besides, it's really not difficult to gather the evidence, if you are dedicated and determined. An experienced team of RDFers can do it very quickly.

Rest assured that when the Auxiliary does its job properly, the FCC will act, if needed. An example is the recent case in Carefree, Arizona, where the FCC levied a fine on a ham for willful and malicious QRM on 75 meters.

VOLMON provided important documentation. Stephen Tsuya, who heads the FCC's Douglas, Arizona, office says, "Not only is the program working, it is providing invaluable help."

About the same time, cooperation between the Auxiliary and FCC Field Operations led to a malicious interference citation in Pasco, Washington, for jamming on 2 meters.

Continued on page 52

Photo. Building a successful case against a jammer requires careful documentation and lots of patience, but the results are worth the effort. (Photo by WB6UZZ)

HAMSATS

Amateur Radio Via Satellite

Andy MacAllister WA5ZIB
14714 Knightsway Drive
Houston TX 77083

Modems for Hamsat Operation

Aside from DX-chasing on AMSAT-OSCAR-13, the most exciting satellite activity this year has been via the digital modes on the Microsats and Fuji-OSCAR-20. To operate via these electronic mailboxes in the sky, you'll need a 1200 baud PSK (phase shift keying) modem in your hamsat-ready earth station.

It is no longer necessary to build your own PSK modem. Since March, companies like PacComm have been shipping units designed to interface with the necessary radios and packet TNCs (terminal node controller) for BBS activity from space. PacComm's modem, listed at $219.95, connects to the modem disconnect header inside the TNC. One land in the TNC is cut to allow connection of the unit. In addition to its 1200 baud mode, the PacComm model will receive 400 baud telemetry from AMSAT-OSCAR-13. PacComm's phone number is (800) 223-3511, and the address is 3652 West Cypress Street, Tampa FL 33607.

If you enjoy kits, TAPR (the Tucson Amateur Packet Radio Corporation) offers their PSK modem kit for $110. A picture of a completed TAPR unit was shown in last month's column. Soldering is tight. An iron with a small tip and a magnifying aid are helpful for constructing this unit. A box is not included, but you can find the recommended (now discontinued) Radio Shack enclosure at some stores.

Photo A. A G3RUH 1200 baud PSK modem hooked up to a packet TNC for Microsat or Fuji digital communications.

The TAPR unit works very well and is currently the most popular PSK unit in the US. It will easily interface with most TNCs using "hardware HDLC." It was not designed to work with the Kantronics KPC-1, -2, -4, -2400, KAM, or the GLB PK-1, all of which use "software HDLC." The kit incorporates three circuit boards, and includes parts, mating connectors, switches, and labels. To align the unit, you need a voltmeter, oscilloscope, audio generator, and frequency counter. You can reach TAPR at (602) 323-1710, or you can write to: PO Box 12925, Tucson AZ 85732.

Radiokit markets the G3RUH PSK packet modem for $111. The G3RUH design has been very popular with many international Fuji and Microsat enthusiasts. Although the "front end" design is modest, it is a very good performer. Restrictions on TNC compatibility are the same as those for the TAPR device. A typical uplink system is shown in Photo A. This modem, employed for Fuji-OSCAR-12 contacts, was built using a G3RUH board from AMSAT-UK. With the addition of antennas, a computer or terminal, and a 70cm SSB receiver, the Microsat and F-O-20 station would be complete. Contact Radiokit at (603) 437-2722. Their address is PO Box 973-C, Pelham NH 03076.

We expect DSP (digital signal processing) equipment from other companies later in the year, but prices for these units will be much higher than prices for single-purpose PSK modems. The DSP systems will be capable of operation via many data transmission formats in addition to PSK.

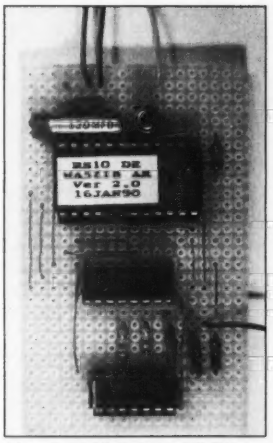

Photo B. "ROBOT CALLER" CW generator for RS-10 operation.

Interpreting Data

Once you have a station ready for PSK operation, what will you see on the screen when operating through the new digital satellites? Table 1. shows a sample of communications with the BBS on board F-O-20. As with a terrestrial packet BBS, several system commands are available for reading and writing messages, listing file headers, and showing the current users.

Unlike earth-based systems, the messages on the BBS are from hams all over the world who have accessed the system directly using VHF and UHF radios. The idea is exciting, and the system is online now. F-O-20 makes between four and six passes a day over most locations worldwide.

Table 2. is a sample of "digipeated" activity via the Argentine LUSAT-OSCAR-19. Before the BBS software was uploaded to the satellite, simple digipeater-type operation was implemented to give users a chance to exercise their equipment in preparation for full store-and-forward activity. You can see telemetry and informative messages between the packets uplinked from users. A complete frequency chart for all the new Microsats and F-O-20 was shown in last month's "Hamsats."

Operation through PACSAT-OSCAR-16 is identical to LUSAT. For WEBER-OSCAR-18, expect to see incomprehensible (raw picture) data. The picture data is compressed and sent via the PSK packet system on the satellite. It's necessary to capture the raw picture data and store it so that you can use appropriate software to describe it later. The AMSAT Software Exchange provides WEBERWARE 1.0, developed at Weber State University in Ogden, Utah, to put the picture packets in the proper sequence, "unsquash" the data and display the color result on a PC or compatible with EGA

Table 1.

Sample of F-O-20 BBS activity.

```
*** CONNECTED to 8J1JBS
FO-20/JASlb Mailbox ver. 2.01
commands [B/F/H/M/R/U/W]
Use H command for Help
JAS>M
NO.  DATE   UTC    FROM     TO       SUBJECT
0138 02/25 21:53  DF5DP    WA5ZIB   Hi Andy !

0090 02/25 18:01  DL1CF    WA5ZIB   HELLO ANDY
0086 02/25 16:46  N5BF     WA5ZIB   Well, there you are!

0079 02/25 16:39  WB6LLO   WA5ZIB   HELLO ANDY!

JAS>F
NO.  DATE   UTC    FROM     TO       SUBJECT
0168 02/26 03:01  LU1EXC   LU1OGG   lusat 1
0167 02/26 02:55  LU8DYF   HK3JHV   Hola Colombia
0166 02/26 02:53  LU6DYD   ALL      CQ de .....

0165 02/26 02:52  LU6DYD   N4HY     DIGI LUSAT-1 EXCELLENT !!

0162 02/26 02:03  JH2XIL   ALL      CQ on FO-20
0159 02/26 01:35  N8HSP    WC8J     hamfest
0158 02/26 01:31  K0RZ     N1CHM    feeds
0157 02/26 01:30  N8AM     N8HSP    Hello
0156 02/26 01:27  N1CHM    K0RZ     Clarification
0155 02/26 01:26  N8HSP    N8AM     hello
JAS>R86
NO.  DATE   UTC    FROM     TO       SUBJECT
0086 02/25 16:46  N5BF     WA5ZIB   Well, there you are!

Andy,  Glad you finally got QRV on FO-20.  I never worked the
FO-12 mailbox myself so can't tell whether it is exactly the same
but I do know that all the features of FO-20 that I was familiar
with (JA, beacons, intermod, etc.) are identical.  Keep in touch
and good luck with upgrades.

73, Courtney
p.s. Your message was time tagged 16:37.  I'm putting this on at
16:50 according to my station clock, but don't know what the Fuji
clock is reading.  Were you on here just ten minutes ago or some
time last night?  CD
JAS>R138
NO.  DATE   UTC    FROM     TO       SUBJECT
0138 02/25 21:53  DF5DP    WA5ZIB   Hi Andy !

Hallo Andy, nice to see your callsign here on Fuji.

Best regards es vy 73 from Germany
de Bert DF5DP
JAS>H
++ Available commands ++


B     : List file headers addressed to ALL
F     : List latest 15 file headers
F*    : List latest 50 file headers
F<d>  : List file headers posted on day <d>
H     : Show this message
K<n>  : Kill a file numbered <n>
M     : List file headers addressed to current user
R<n>  : Read a file numbered <n>
U     : List current user(s)
W     : Write a file
```

Table 2.

Digipeater activity via LUSAT-OSCAR-19.

```
WA5NOM>HK3JHV,LUSAT-1*:

Hello from Gil in Friendswood, TX.

I am away from the terminal now.  Please leave your message.


LUSAT-1>TIME-1:

PHT: uptime is 073/12:54:49.  Time is Mon Feb 26 03:47:28 1990

WA5NOM>HK3JHV,LUSAT-1*:

Hello

WA5NOM>HK3JHV,LUSAT-1*:

This is Gil in Friendswood, Texas

HK3JHV>WA5NOM,LUSAT-1*:

hello, my name Juan Eduardo>

WA5NOM>HK3JHV,LUSAT-1*:

Glad to work you, Juan.  First contact on LUSAT.


HK3JHV>WA5NOM,LUSAT-1*:

greetings from Colombia. bye and 73

Digipeater code is loaded.  If the LSTAT contains
d:1 the digipeater is on, o.w., it is off.  There will times
when it must be off.  Use and enjoy! 73 de BM

LUSAT-1>LSTAT:

I P:0x1A77 o:262 l:6649 f:9535, d:1

*** CONNECTED to N8AM VIA LUSAT-1

LUSAT-1>TIME-1:

PHT: uptime is 073/12:59:29.  Time is Mon Feb 26 03:52:08 1990

fb n8am de Andy in Houston

LUSAT-1>AMARG:

Digipeater is OFF.  Will be uploading a bug fix.

73 de BM

LUSAT-1>TIME-1:

PHT: uptime is 073/13:01:39.  Time is Mon Feb 26 03:54:18 1990

LUSAT-1>TLM:

21:96 22:7D 23:36 24:2C 25:30 26:00 27:00 28:00 29:00 2A:00 2B:00
2C:00 2D:31 2E:01 2F:9E 30:9E 31:9F 32:66 33:00 34:A4 35:A6 36:C4
37:9F 38:BC 39:A5 3A:A4 3B:FF 3C:03
25E918EA

LUSAT-1>TLM:

00:64 01:79 02:70 03:5F 04:6C 05:7F 06:70 07:84 08:6A 09:77 0A:A4
0B:A8 0C:EA 0D:D9 0E:01 0F:45 10:D6 11:84 12:00 13:01 14:B4 15:A3
16:80 17:7A 18:78 19:7B 1A:7C 1B:44 1C:73 1D:75 1E:2A 1F:5D 20:83
25E918EA
```

or VGA graphics. For information on program availability, you can call AMSAT at (301) 589-6062 or write to: AMSAT Software Exchange, 850 Sligo Ave. #600, Silver Springs MD 20910.

The Dove Scare

In mid-March, work on BBS software for L-O-19 and P-O-16 came to a halt. The computer on DOVE-OSCAR-17 had stopped, and one of the 2 meter transmitters was "key down" with no data coming from the satellite. AMSAT Director Bob McGwier N4HY and AMSAT Brazil (BRAMSAT) President Junior de Castro PY2BJO futilely sent reset commands to DOVE.

The uplink command frequency for DOVE is within the 2 meter band. With one of the satellite's 2 meter transmitters continuously sending a carrier, the desense of the command receiver is quite significant. Bob N4HY asked Dave W5UN for help. Located just south of Houston, Dave has the world's largest privately-owned 2 meter array with over 32 dBi gain. With one kW of transmitter output, the effective radiated power of Dave's incredible system approaches two megawatts. *[Ed. note: W5UN's moonbounce antenna system was wiped out by a tornado shortly after this attempt!]*

They planned the uplink reset attempts during a time when the satellite was just going into darkness (eclipse). The transmitter output would be weakened as the system voltage dropped, but the command receiver would still be functioning.

It worked as predicted. Dave's system was able to over-power the satellite's transmitter and command it to re-set. When the now-silent DOVE came within range of Harold NK6K, one of the satellite design engineers, he immediately began sending battery-charging rate commands and transmitter-state commands to the satellite. Later, N4HY sent the command to turn on the Mode S 2.4 GHz transmitter. Bill KØRZ listened from his home in Colorado and relayed information as Bob continued to upload code to DOVE from New Jersey.

The effort to completely redo the code in DOVE's computer precluded any immediate return to service on 2 meters. The satellite designers did not want any repeat of the computer latch-up problem. As N4HY said, "This has been a harrowing experience (for many) and once again, these robust little cubes take a lickin' and keep on tickin'!"

ROBOT Caller

Your response to the construction topic featured in the April "Hamsats" column has been exceptional. The three-chip ROBOT-CALLER circuit works well and has given many RS-satellite operators a chance to make ROBOT autotransponder contacts via RS-10 without using difficult keyers or RF-noisy computers. Photo B shows one version of the simple circuit.

The most common complaint about the project has been the difficulty many have had in finding an EPROM burner to program the CW message "RS10 DE 'your call' AR". If you would like to have an EPROM for your ROBOT CALLER, but you don't have access to a burner, I will make a custom-programmed EPROM using your callsign for $9. I'm not set up for mass production, but I can provide this service on a limited basis. Contact me at the address above. 73

Homing In

Continued from page 50

Since I wrote last month's column, the HF Homer (see the April "Homing In") has proven its worth in tracking down the source of serious 20 meter QRM in Orange County, California. Auxiliary members followed the same documentation procedures.

These successes may seem like only a drop in the bucket, but don't lose your perspective. Sure, malicious interference is a federal offense, but only because amateur radio is under federal jurisdiction.

Most of the time, willful QRM doesn't constitute a danger to life and property. That's one reason that it's hard to get the FCC and the US Attorney to take jammers to court. The case has to be severe and continuing to get a high priority.

As everywhere else in life, different people perceive things differently. Hams tend to react as if all jamming were a form of electronic terrorism. But to the non-ham world, including many FCC staffers, our on-the-air spats aren't much different from a family feud. To them, a belch or a cuss word in the middle of a net is not comparable to grand larceny. It's more like spray-paint graffiti.

Now don't get me wrong—I'm not saying we should let non-life-threatening offenses go unchallenged. Let's DF them and stop them, either with friendly persuasion or the government's big stick. But we must not let the miscreants bring our nets to a screeching halt, with everybody spending time bemoaning the problem.

Mum's the Word

If you're part of the Auxiliary's RDF team, go about your work quietly. Don't get on the air and talk about it. That kind of fanfare just turns the hunt into a cat-and-mouse game.

If you're not on the RDF team, you shouldn't talk about the presence or absence of hunters, either. When a heckler attacks your net or QSO, don't acknowledge his presence in any way. Don't threaten him, berate him, answer him, or even mention him.

Any acknowledgment of the interloper gives him what he wants and encourages him to continue harassing you. This entices other jammers to join in, resulting in total bedlam. Many VOLMON members refuse to get involved if the victims do not ignore the jammers, and I don't blame them.

Always remember that the goal of all OO/AA activities is compliance, not revenge. VOLMON's actions are intended only to eliminate violations of Part 97 rules. Don't try to use the Auxiliary to "get even" with someone for personal injustices of the past.

Simple RDF gear does a very effective job in the VOLMON program, and I hope you're getting your setup together. If you want to join the Auxiliary or discuss the heckler on your net, please don't call me. Your ARRL section manager handles those tasks. But I welcome your letters with specific inquiries and ideas about all kinds of RDF equipment, particularly when they include an SASE. 73

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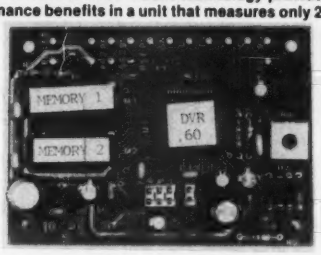

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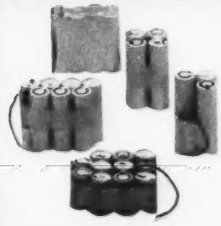

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CIRCLE 191 ON READER SERVICE CARD

73 Review

by W. Max Adams W5PFG and Donald F. Brooks W5ORW

Pipo Communications P-7 DTMF pad.

A quick and easy analog-to-digital tone converter.

Pipo Communications
PO Box 2020
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Price Class: $60

Dual tone multiple frequency (DTMF) signalling came to amateur radio from the world's most used device, the telephone. DTMF, in this application, uses eight "odd" voice band frequencies arranged in a row-column matrix. Operator selections, when a push switch is pressed, produces a composite two-tone or dual signal. "Odd" is used to describe the DTMF frequencies since they are not harmonically related frequencies.

Push switches are arranged in four rows of three (or four) columns, and assigned numeric digits one through zero and symbols, such as the * (star) and # (pound). The fourth column provides an additional four DTMF signals, labeled A, B, C, and D, which are used for special signalling applications. Although individual tone frequencies may vary in different countries, the keypad matrix arrangement, is an international standard. Precise (+/− 1.5%) transmit and (+/− 2.0%) receive frequencies do not easily produce distortion product (sum or difference) frequencies—distortion products can cause "false" signalling.

Contemporary amateur radio VHF and UHF equipment often includes a DTMF keypad, installed as part of the main unit or as an accessory on hand-held microphones. Home-brewing hams often add a DTMF keypad and design new devices to improve their older equipment or their operating capability. DTMF integrated circuits provide inexpensive "central office quality" DTMF tone transmit and receive features. Pipo Communications, Inc., manufactures ready-to-go DTMF assemblies, easily adapted to any HF, VHF, UHF, or SHF radio, or even to special signalling devices and test equipment. Major specifications for various Pipo PK-series keyboards are shown in Table 1. Use your Reader Service card to obtain complete specifications.

Don Brooks W5ORW, a local solder-burning home-brew expert, wanted mobile DTMF signalling from his old pick-up truck. He always keeps one eye on the other driver(s) and uses the other eye as necessary. I forwarded a Pipo Communications Model P-7 keypad to Don, which was provided by *73 Amateur Radio Magazine*.

Don writes: "A hand mike with DTMF was of little concern when I purchased my '7625' several years ago, since our local repeater did not have an auto-patch. Later, however, the Anderson County and Palestine ARC installed a local area machine equipped with auto-patch, which started my search for some mobile DTMF. I finally adapted a Dallas Sidewalk Sale (flea market) telephone handset tone pad for use with the 7625's four-pin audio input connector. I wired the fourth pin for transceiver PTT and used the existing mike input, ground, and +9 VDC to power mobile DTMF from my truck. It sat on the dashboard telephone and fell off every time I turned a corner.

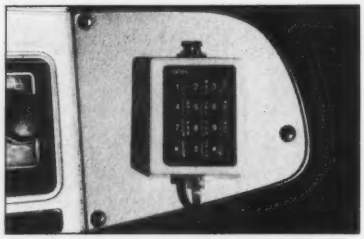

Photo A. Close-up view of W5ORW's Pipo P-7 keypad. Note PTT push switch on top edge and cable connection on bottom edge.

"When I received the Pipo Model P-7, my first idea was to attach it to the back of the hand mike, but nothing is as simple and easy as it first appears on paper. This required microphone wiring changes, making it a non-standard device, and an adaptor to flatten out the uneven back of the microphone.

"Mulling over the DTMF problem, I came upon a junk-box telephone wall mounting outlet box with a nice small connector and miniature four-conductor cable. 'AHA!' I thought. Here is the solution! I will mount the P-7 on the wall box and use the old red telephone cable already connected to the 7625.

"I mounted a red button SPST momentary push switch on the top of the wall box, leaving the connector on the bottom. This way I could press the PTT switch with my big right thumb and play the keypad with my remaining push switch pushers." (Don was not lucky enough to get a Pipo dash K model with a PTT holding relay and adjustable interdigit dialing delay feature).

"I tested the assembly before it was installed. I connected an O-scope to the Pipo output and observed each DTMF signal and found very clean composite two-tone waveforms. I also could not see any difference in output signal levels. I adjusted the output signal level to equal that of the microphone as I bellowed a loud *Ahhhhhhhhhh* in front of it." (Output level is adjustable through a small hole in the bottom edge of the Pipo unit).

"I used double-stick plastic tape to fasten the assembly to the dashboard and I connected the output/power cable. I brought up our 'finicky' auto-patch on the first try!

"This project provides a safe, easy to use (while driving) adaptation add-on to my older model radio. The positive detent of the push switches makes operation easy while watching the road, especially in traffic or at night."

Three of Pipo's many fine features merit special mention. First, Pipo's data sheets are among the best that I have seen in 48 years of amateur radio. They include a complete description of the features, power connections, level setting directions, output circuit details, mounting, physical dimensions (with a drilling template included with each unit), and service/repair information. Second, Pipo's P series DTMF keyboards operate with 8.5 to 16 VDC, and use only 0.1µA standby (idle) current and 20 mA maximum operating current when a push switch is pressed. Third, the unit's low output circuit impedance allows it to interface with most low and high input impedance transmitters or other equipment, with sufficient power to permit losses due to load circuit impedance or resistance.

I know anyone interested in obtaining a DTMF keypad will be more than satisfied with the offerings from Pipo Communications.

Table 1. Some of Pipo Communications P Series DTMF tone generator specifications.

Keys	Steel
Contacts	Sealed gold dome, waterproof
Volt Operating Range	8.5–16 VDC
Temperature Operating Range	−22°–+160° F.
Output	+2dB at 600Ω (3V PP) at IC pin 16
External Keying	IC pins 2 & 10 serve as source driver (3–9 VDC at 1–3 mA)
DTMF Frequencies	Standard with −0.73 to + 0.74% error range
Dimensions	P-7V: 1.50"(W), 2.16"(V)
Features	Automatic number identification, 10 number memory dial

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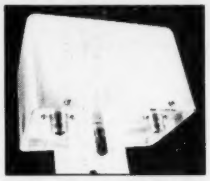

Model 146 $179
Model 146OS $179
Model 440 $189

Model 146 160W 2 Meters 19db Gain .75db Nf
Model 146OS 160W 2 Meters 19db Gain .75db Nf
Model 440 70cm 100W 16db Gain .75db Nf

All preamps have helical filters to prevent out of band intermodulation in the receiver. Model 146 covers the entire 2 meter band. Model 146OS is of very narrow bandwidth and would be suitable for SSB. Packet, or Satellite. Model 440 is factory tunable from 430–440 MHz or 440–450 MHz per customer request. All models are powered with 13 to 20 VDC and are mounted at the antenna.

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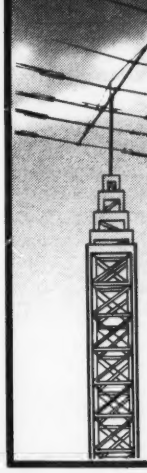

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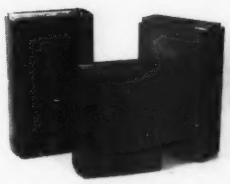

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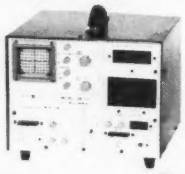

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The SFA on 15 meters

Does the job without drawing the neighbors' attention.

by David Younker KA8OGD

While driving to work one day, I listened to several apartment-dwelling hams bemoaning the lack of space for, and/or regulations against, antennas at their residence.

I listened for a time, then broke in to describe an antenna that I had used in similar circumstances: a shortened, loaded vertical dipole. I'd used it on 6 meter FM, but a variation of the design could easily be built for 15 or 10 meters.

Cut and Match

While a loaded vertical dipole combined with low power is not likely to get you DXCC overnight, it gives an easy and inconspicuous way for the condo-dweller to get on the air. And the way propagation's been going these days, you will likely make many fine DX contacts on it.

This antenna is shrunk to one-third the size of a normal dipole, and is narrowband at around 100 kHz between the 2:1 SWR points. You can cut and adjust it to the frequency you normally operate on, and use an antenna matcher where you normally don't.

I started out with a full-size wire dipole for 15 meters, simply to have a reference point for the mutilations to come. Eleven feet, three inches brought the SWR down to 1:5 to 1 at my desired frequency of 21.1 MHz. I removed half of the dipole and replaced it with a PVC pipe 18″ long x 3″ in diameter. Other forms you have at hand—e.g., wood, a Plexiglas tube, a quart beer bottle, the neck from the junior op's guitar—would work fine.

Building the Coils

If you use the PVC pipe, wrap approximately 22 turns of heavy #16–12 wire, spaced ¼″ between turns. Attach the coil to the half dipole and test. Once you get the SWR down to an acceptable level, remove the coil and start on the other element.

I used a 3′ length of 1¼″ aluminum tubing, an 18″ length of 1″ PVC pipe, and another 18″ of aluminum tubing. Space the two pieces of tubing 6 inches apart on the PVC pipe, drill, and install a bolt long enough to go through the tubing, plus enough to spare for the nut and one turn of wire.

Wind turns of the same size wire on the upper coil that you used on the bottom coil. Test and adjust as necessary. You can use small size wire, but the heavier wire will allow a greater frequency excursion before the SWR rises too much.

Wrap the assembled coils with electrician's tape to keep the turns from slipping. Attach the coil and element to a 4″ x 6″ piece of Plexiglas, attach coax, and bolt the assembly to a block of wood about 2″ x 2″. Now just stick it out the window, mount it vertically with the short coil towards the ground and load it up!

Operating Hints

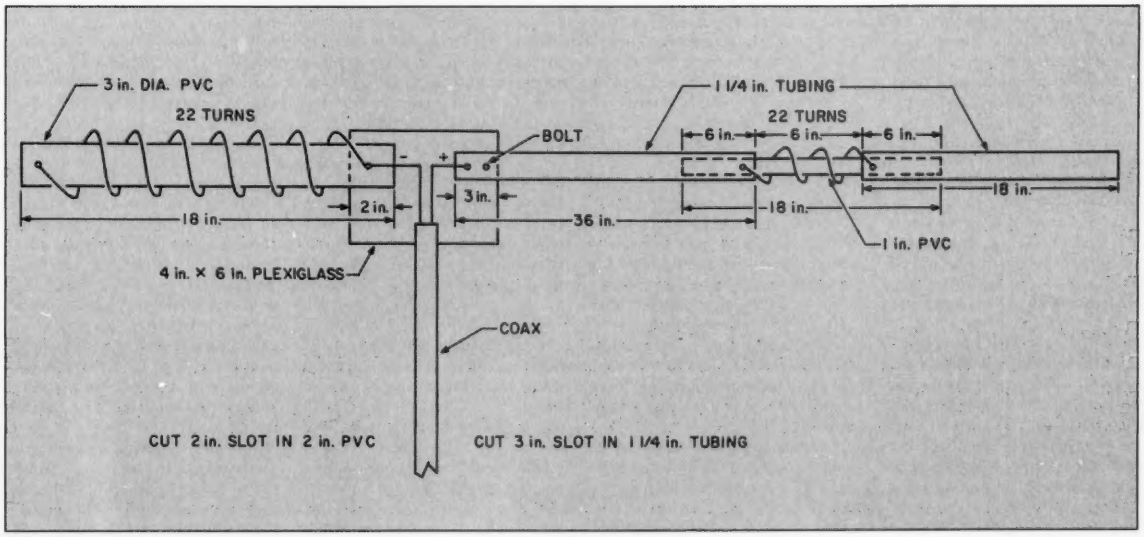
If the outside of the building is metallic, the SWR will rise. Make adjustments on the lower coil. However, a metallic exterior also acts as a reflector and gives the antenna some directionality.

Conclusion

Cost was approximately $3, most of which went for the 18″ PVC pipe for the lower coil. The Plexiglas came from the junk box, as did the wire for the coils. This is definitely a quick and cheap way to get out on 15m.

What does SFA stand for? Short, Fat Antenna! FA

David Younker KA8OGD may be reached at 8763 Royalton Rd., Amanda OH 43102.



15m SFA construction plan.

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Dead or Alive

Last month we explored the two basic types of DC power supplies, linear and switching. This month, let's look at what it takes to fix them.

Typically, power supply malfunctions come in two flavors. Either the supply's output is dead, or it is there but the voltage is incorrect. Often, it will be too high, and may contain significant ripple.

First, let's look at the case of a dead linear supply. There are several possible causes. A part simply may have gone, or a short in the circuit being powered by the supply (the "load") may have attempted to draw too much current. More often, the latter is the case. The first thing to check is the fuse. If it has blown, it's a dead giveaway that something has shorted. If you've got a few spares, try changing the fuse and turning the rig on. Most likely, the fuse will just blow again.

Never put in an overrated fuse. It won't fix anything. All you'll do is cause more damage, and perhaps even a fire! With a good fuse installed, disconnect the load and see if the output voltage comes back. Naturally, do your disconnecting with the power off and the line cord pulled from the wall. Remember: AC wall current is fatal and must *never* be treated lightly.

If the supply appears to be working with no load, then there is very likely a problem somewhere else, and the supply may be fine. It is possible, however, that the original problem has caused some damage to the supply, in which case attempts to draw the normal current will result in loss of voltage or regulation, or high ripple. If that's the case, the likely culprit is the "series pass" regulating transistor or IC through which all the current passes. In fact, any time you find a shorted load, it makes sense to check the pass transistor, as it will often be shorted or open as well. Don't just assume that because there is voltage, the supply is working properly.

Now might also be a good time to try to find the short in the load (the radio) and fix it, so that you can use it to test the supply. (Some regulators won't work properly without at least a small load.) If a resistance check from the load's DC power input line to ground shows zero ohms, you can be sure something has gone. In that case, look especially for shorted power-handling components such as output transistors. Another possibility is a large electrolytic capacitor placed across the DC input. Unless you can see burn marks or blown printed circuit board traces, you'll have to disconnect each suspected part and test it separately. The test is easy, though. Just look for a dead short, zero ohms.

Getting back to the supply, if it is still not working, check that fuse again. If it's gone, you have a short somewhere in the supply. If not, then something, most likely the series pass transistor, is open. To find a short, pull the plug, discharge the filter capacitors (short them with a 10-ohm resistor followed by a direct lead to ground) and do resistance checks of the rectifiers, filter caps, and any other component going to ground. For an open, plug the supply in and do voltage checks, starting with the output of the bridge rectifiers and continuing on toward the supply's output. When the voltage disappears, you've found your problem.

> ***"True switching power supplies present a different set of problems. First of all, they can be dangerous to work on."***

Now That's a Switch

Linear supplies with switching regulators are a bit harder, but not that much. Follow the same procedures to find a short, and pay extra attention to the switching transistor used to chop the power.

For an open, check that you have voltage at the input (collector or emitter) of the switching transistor, where the raw DC power enters. If the transistor shows no activity, check its base for pulses coming from the regulator. If they're there, the transistor is probably bad. If they're not, the regulator IC is the likely culprit.

True switching power supplies present a different set of problems. First of all, they can be dangerous to work on. Significant parts of their circuits are connected directly to the AC line, rather than being transformer-isolated, as with a linear supply. If you have a 1:1 AC isolation transformer or a variac, use it. If not, be *extremely* careful to avoid contact with the circuit. Keep one hand in your pocket, wear shoes, and consider wearing rubber gloves.

A switching supply is much like a switching regulator, except that there's a transformer in the middle of the circuit and the whole thing looks more complicated. There may be protection circuits, and sometimes a failed one can kill the whole supply. In any event, if the thing blows fuses, you'll have to start by doing unpowered resistance checks (don't forget to pull that plug and discharge the caps). Take a good look at the chopping transistor, where the raw DC power is turned into pulses capable of being passed through the transformer. These transistors do most of the work in switching supplies, and are frequent causes of short-circuit failure. When you find the bad part, check the parts around it, because it may have drawn heavy current through them and damaged them. Emitter resistors are especially vulnerable to this.

As I mentioned, switching supplies often have protection circuits built in. The idea is to prevent supply destruction or too much voltage at the output (which could harm the load) in the event of a part failure or a strong power line spike. A common form of protection circuit is the "crowbar," which places a short across an intermediate point in the supply, causing the fuse to blow. That's one of the many reasons you should never try using an overrated fuse; you could defeat the protection system and make matters much worse.

Sometimes these protection devices fail, and it looks like the supply itself has a short. Look for SCRs, transistors and diodes which feed back from the output of the supply. Some will go to the regulator IC. Those are probably not the ones you want. Others will go back near the chopping transistor, and this is what you are looking for. Check anything that goes to ground.

If the supply is dead but not blowing fuses, something is open, just as with a linear supply. In this case, though, a bad regulator IC, shorted, open or otherwise, can keep the chopping transistor turned off (and effectively open). If the transistor is good but there are no pulses at its base, then it's a good bet that the regulator IC is bad. In normal operation, the duty cycle of the pulses changes to accomplish regulation, but they should always be there.

A few words about parts replacement: some of the parts in these supplies have special properties and must be replaced with factory parts, not generic substitutes. Often, this is true of the chopping transistor and the disc capacitors surrounding it. Almost always, these parts will be specially marked with warnings on the schematic. Don't play games here. Use of the wrong parts can result in supply or radio damage, or even fire. If you need one of these components, order it from the manufacturer.

The Mysterious Mr. Switch

Switching power supplies are something of a mysterious art. The ideas seem straightforward, but actually getting the things to work reliably can be quite difficult. You may see odd-looking parts and circuits which seem to make no sense. There is great variation from design to design. And sometimes, inexplicable repeat failures occur. I remember one of the first consumer products to use a switching supply. It was a small color TV that came out around 1970. Most of them were great. Occasionally, though, one would blow its supply. No matter how many times it was fixed, it would keep doing it. You could replace every part in the circuit, and it would die again a month later. The only cure was complete replacement of the supply. No one, not even the manufacturer, ever figured it out. Fortunately, the art has significantly advanced since those days. Today's designs are remarkably reliable, as proven by the hundreds of thousands, perhaps millions, of switchers humming along year after year in desktop computers.

Now, let's look at a letter:

Dear Kaboom,

Is it possible to hook a FAX machine up to an HF or FM VHF rig? Seems to me it would be a great way to send written information back and forth. How about using a phone patch to connect it?

Signed,
Just the fax, please

Dear Just,

Sounds like a great idea! The normal telephone bandwidth is about the same as we use (less than 3 kHz), so it seems reasonable. There are other considerations, though. Phone lines have far less phase distortion and noise than HF, and they are also full duplex, or two-way. Modern FAX machines signal each other synchronously. That is, one beeps and the other answers before they commence communications. With some diddling, though, I don't see why it couldn't be done, at least on VHF. You may have to use a slow baud rate, but most faxes offer several speeds. Have any of you readers out there tried this? Let me know, and I'll pass the info along. Who knows, it may even lead to an interesting column.

By the way, I haven't been getting a great many appropriate letters lately. If you've got any questions relating to solid state gear and/or general troubleshooting, send 'em in. See you next month. 73

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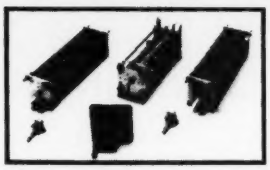

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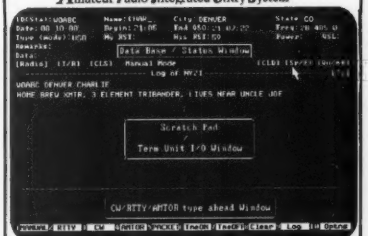
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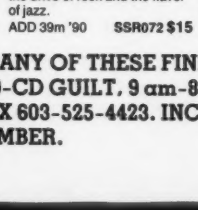

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CD Review 10/10 Apr.'90
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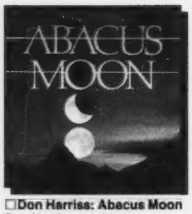

☐**Don Harriss: Abacus Moon**
Don Harriss combines pop beats, flowing piano lines, counterpoint, Philip Glass-style chords, and whistling Tomita-style timbres and keeps you interested, amazed, and amused.
CD Review 8/9 May '90
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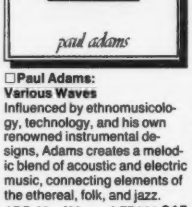

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☐**Allan "Mac" McHale and the Old Time Radio Gang: Old-Country Radio Songs**
A beautiful collection of old-time country ballads, gospel tunes, and happy songs.
CD Review 10/10 Mar.'89
DDD 45m '88 **FKE2062 $15**

☐**Sing Out America!**
An all-digital live recording from an '88 concert. Featuring Northeast Winds, Robbie O'Connell, Shaw Brothers, and White Mountain Singers.
CD Review 10/10 July '89
DDD 44m '88 **FKE2063 $15**

☐**The Limeliters: Harmony!**
Digitally recorded live in concert, this popular folk disc presents founding members Lou Gottlieb and Alex Hassilev, along with tenor Red Grammer and instrumental whiz John David.
DDD 64m '87 **FKE2056 $15**

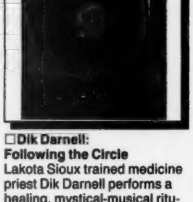
WORLD

☐**Huayucaltia: Horizontes**
With Andean pan-pipes and flutes, and various guitars, percussion, and winds, six musicians create socially aware "Nueva Cancion," jazz, folk, and contemporary styles that are distinctively their own.
AAD 43m '89 **ROR26009 $15**

☐**Ali Jihad Racy: Ancient Egypt**
Tribute inspired by Tutankhamun's tomb. Composed and performed by Ali Jihad Racy, ethnomusicologist and master musician, featuring authentic instruments.
ADD 39m '89 **LYC7347 $18**

☐**Northeast Winds: Easy and Free**
This is their fullest, richest sounding disc yet. Taylor Whiteside joins the group, bringing his fiddle, accordion, guitar, and pennywhistle.
AAD 58m '90 **KRM880 $15**

☐**Bagad de Lann-Bihoue**
This military Breton pipe band presents pieces from different Breton regions, Scotland, Bulgaria, and even some jazz.
DDD 48m '89 **KEL09 $15**



☐**Dik Darnell: Following the Circle**
Lakota Sioux trained medicine priest Dik Darnell performs a healing, mystical-musical ritual. Sounds range from a synthesizer to a turtle shell rattle three centuries old, wooden flutes, a ceremonial drum, chanting and nature sounds.
AAD 61m '89 **ETH70012 $15**

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Is This Really What The PC Was Invented For?

We hams and RTTYophiles deal in digital communication. Never before, I should think, in the history of communications, has there been so great a push to get anyone with a computer on-line, as there is now by a certain consumer-oriented service—namely, Prodigy.

Plastered all over the place, in popular magazines, on the radio, and on television, are the ads for the Prodigy service, always with the tag line, "Finally, what the PC was invented for." Well, I tried the service, and I came away with a bit of an opinion in answer to the above.

First, the Good

Prodigy represents an easy, painless way for the average computer user to get on-line. Little is needed in the way of communications expertise. The Prodigy program is easily installed on a hard disk drive, or you can run it from floppies. It is not copy protected, so making a working backup is simple. The entire program is menu driven, with choices simply and directly available at every step.

There really are enough features and services available on-line to tempt even the most resistant potential user. News services, sports lines, stock tickers, weather forecasts, and other up-to-the minute information services are available, as well as special interest group forums. I won't try to list them here, since the roster keeps growing. Suffice it to say that the probability is high that you will find some of interest.

There is also the availability of interfacing with local merchants and banks, depending on where you live. Here in Baltimore, on-line banking and shopping services are available, albeit for a fee, with several institutions. For the individual who has difficulty traveling, this could be a lifesaver.

Prodigy is cheap. Really! For less than ten dollars a month, you get unlimited access to the system. Assuming you do not use on-line banking or shopping services, which may generate additional charges, this is about the lowest cost commercial service you will find.

Hard to Grasp

Although I liked much about Prodigy, there are certain facets of its construction that really bother me. To begin with, logging onto the system requires a password composed of a seemingly random group of letters and numbers. A typical one might be something like ASL112B. Why? Further, there is no way for the system to store the password and enter it automatically. While other on-line services, such as CompuServe and Delphi, require a password, my terminal program will store it and serve it up at the requested time. Not Prodigy, where I must type it in by hand every time. I fail to see why, in my home, on my computer, in my den, I am forced to act as though I were on a public terminal.

While there are all kinds of useful facts and figures you can punch up on the screen, for the most part, there is no way to save any of it. There is neither a facility to save any data to disk, nor one to print it out. Even a crude *PrtSc* attempt will fail. If you access material to help your child on her term paper, you are forced to grab a pencil and pad to write down the information.

Prodigy is slow! Even running at 2400 baud, the packet protocol makes the wait for each screen utter agony. Although the attempt is made at creative lines, graphics, and shadowing, the tradeoff for the overhead makes me glad I'm not paying per minute.

Prodigy tries to be pretty, but it just misses the mark. The screens on my EGA display lacked any snap or vibrancy, with the widely spaced display lines characteristic of a CGA display. The colors seemed to be low-intensity tones. This may be okay for CGA, but for EGA or VGA, blech!

Although Prodigy is an on-line service, it differs from other such services in the absence of facilities for uploading or downloading files and programs. There just aren't any. So, if you are looking for the latest in shareware for your PC, look elsewhere.

While Prodigy is marketed nationwide, I am sure that many of you have heard by now that it's not *available* nationwide. Local service is available only to major cities. Even here in Baltimore, not a small city by most standards, there is no Baltimore number; one must dial into a suburban county to gain access. With certain areas of the metropolitan area unable to dial into such areas without a toll charge, this does change the price of the service somewhat.

The Answer

As I said, the biggest thing Prodigy has going for it is the ease of use. Many, if not all, of the utilities and features offered on Prodigy are also available on larger systems. What Prodigy adds, however, is a relatively foolproof way to access that information. Further, it does its job at a very affordable out-of-pocket cost.

Things begin to cloud, though, with the introduction of such products as the CompuServe Information Manager. This "front end" program hides CompuServe's complicated syntax behind a windowing, menu driven environment. Yes, CompuServe is more expensive than Prodigy, but you get what you pay for.

Other terminal programs, such as Procomm, Crosstalk, or my favorite, QModem, allow easy access to services, and the printing out or downloading of information. Why users of Prodigy should be denied such basic functions is beyond me.

Each screen in the Prodigy service is complemented by an advertisement featuring a product or service the user may be interested in. These ads doubtless generate revenue, but they detract from the speed of the system since they often include complex graphics. Why not allow free access, using the Prodigy software with the ads present, but offer the option of accessing the system with a conventional terminal program and charging for time? If such access were to become available, free of graphics overhead, packet switching, and other constraints imposed by the system, it might attract "power users" to the service.

> ***". . . an easy, painless way for the average computer user to get on-line."***

Why can't a routine be added to allow data to be saved? Either a print-screen or save-data-to-disk option would be nice. It sure would make it possible to use the database for something more than just to satisfy curiosity.

Any critique or review would be incomplete, I suppose, if it did not include at least a few ideas or suggestions for improving what the reviewer feels is wrong. The preceding comments are offered in that vein. If you have used Prodigy, I would be interested in hearing your viewpoint. I understand from some of my writing buddies that Prodigy has been reticent to grant interviews or answer some of these questions. Maybe this piece will generate some such information.

Chips Ahoy!

Several items have crossed my desk in the way of thoughts, ideas, or requests for simple projects that would be appealing to the RTTYophile. I am open to suggestions from the congregation. Any thoughts or concepts for one-night, interesting projects would be appreciated. Either a project itself or a question—"How about a device to. . ."—is fine.

As always, comments or questions may be addressed to me via postal service (still a bargain at only two bits) at the above address, or via CompuServe (ppn 75036,2501) or Delphi (username MARCWA3AJR). And, by the way, if I haven't said it lately, thanks to all of you for making "RTTY Loop" one of *73's* top features! 73

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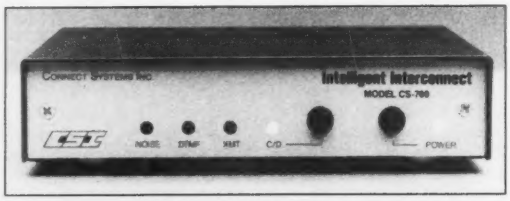
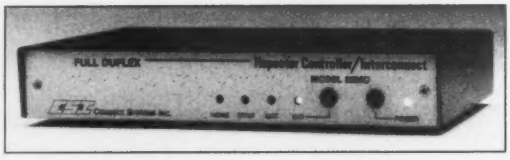




PRODUCTS OF THE MONTH

CONNECT SYSTEMS INC.

The new Model CS-700 from Connect Systems, Inc. is a Simplex Base Station Interconnect that provides user-selectable VOX Enhanced Sampling (sampling rate reduced while land party is speaking) or VOX Controlled Sampling (no sampling while land party is speaking). The latter mode is similar to using a straight VOX patch. This is the first low cost interconnect to include features such as autodialing, re-dial, fully regenerated DTMF (or pulse) dialing, automatic busy/dialtone disconnect and user-programmable CW ID. The suggested retail price is $360.

A second new product from Connect Systems, the Model 8200 Full-Duplex Interconnect and Repeater Controller, can be user-programmed into four selectable operating modes: Full-Duplex Patch, Semi-Duplex Patch, Semi-Duplex Privacy Mode, and Repeater Controller with Duplex Patch (perfect for club systems). A built-in keyboard and digital display give the user complete control of all features and operating modes. A partial list of new features includes: 90 phone number auto-dialer, last number re-dial, remote hook-flash, keyboard programmable CW ID, powerful toll protection, 1–6 digit access code, 1–6 digit secret toll override code, telephone remote base, remote-controlled relay, regenerated tone/pulse dialing and user-selectable courtesy beep. Options include a plug-in CTCSS board that converts all modes to CTCSS operation (32 selectable tones) and ANI software that allows the local or remote programming of up to 50 separate 1–6 digit autopatch access codes. The Model 8200 retails for $550.

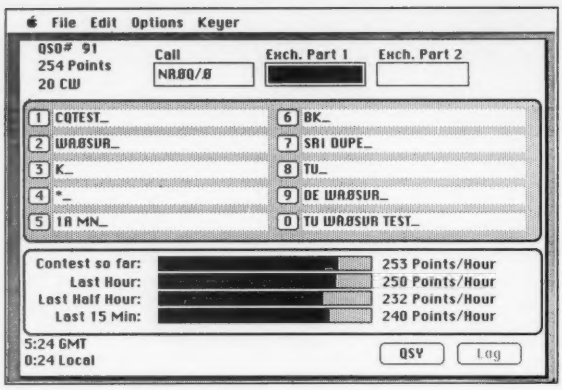
For more information on both of these products contact *Connect Systems Inc., 2064 Eastman Ave. #113, Ventura CA 93003. (805) 642–7184.* Or circle Reader Service No. 201.

BAYLIN PUBLICATIONS

World Satellite TV and Scrambling Methods—The Technician's Handbook by Frank Baylin, Richard Maddox and John McCormac is a text for technicians, satellite professionals and curious do-it-yourselfers. The authors have explored all components of home satellite systems from the perspective of a technician who wants to understand their design, operation and repair. Circuit and block diagrams of most components are presented and clearly explained throughout the handbook.

Nearly one third of this book is devoted to an in-depth study of broadcast formats including NTSC, PAL, SECAM and MAC, digital audio and techniques, as well as basic scrambling and encryption methods. The book also includes a discussion of current American and European current TV technologies and chapters on troubleshooting and setting up a test bench.

This book is available for $40 plus $2 S & H from *Baylin Publications, 1905 Mariposa, Boulder CO 80302. (303) 449–4551.* Or circle Reader Service No. 206.



SYSTEM ONE CONTROL, INC.

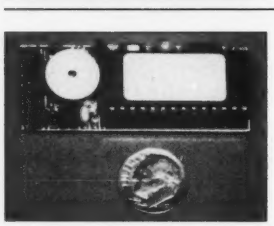
System One Control announces the release of **FDlog!** version 1.5, contest logging software for the Macintosh. The original program offers online logging and fast dupe checking functions plus statistical bar graphs and a CW memory keyer. Version 1.5 adds a full-featured digitized voice memory keyer capable of speaking the other station's call and serial number in the operator's own voice. Log and dupe sheets can be printed after the contest, and their information may be put on diskettes for use by word processor, spreadsheet or database programs for the regular station log. You need a Macintosh 512KE or newer, and System 6.02 or newer.

The FDlog version 1.5 is priced at $50 plus $2.00 for shipping from *System One Control, Inc., 3900 85th Ave. N., Suite 200, Brooklyn Park MN 55443. (612) 424–2772.* Or circle Reader Service No. 203.

OPTOELECTRONICS

The new Model 2210-A Personal Frequency Finder/Counter is a test instrument that will fit in a toolbox or in the palm of your hand. It measures 4" x 3.5" x 1" (14 cubic inches) and weighs only 9 ounces. Despite its small size, the Model 2210-A specifies an operating range from 10 Hz to 2.4 GHz and is useful to 2.8 GHz. It detects and displays two overlapping frequency ranges: 10 Hz–12 MHz and 10 MHz–2.4 GHz, with resolution of 1 Hz and 100 Hz respectively. The accuracy is ±1 PPM.

The Model 2210-A is priced at $220. Contact *Optoelectronics, 5821 N.E. 14th Ave., Fort Lauderdale FL 33334. (800) 327–5912; (305) 771–2050.* Or circle Reader Service No. 204.



A & A ENGINEERING

The Signal Sentry from A & A Engineering is a microprocessor-controlled DTMF decoder with program and store capabilities. It can be user-programmed to store and remember the caller's ID number and eight distinct notification numbers. It is small enough to fit into most radios, including some HTs. The Signal Sentry needs 6 to 16 VDC and uses only 12μA when in the sleep mode and just 12mA when a call notification is in progress. This unit can also be used as a radio remote con-

continued on p. 64

LINK COMM

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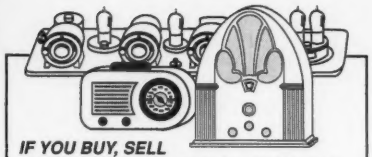

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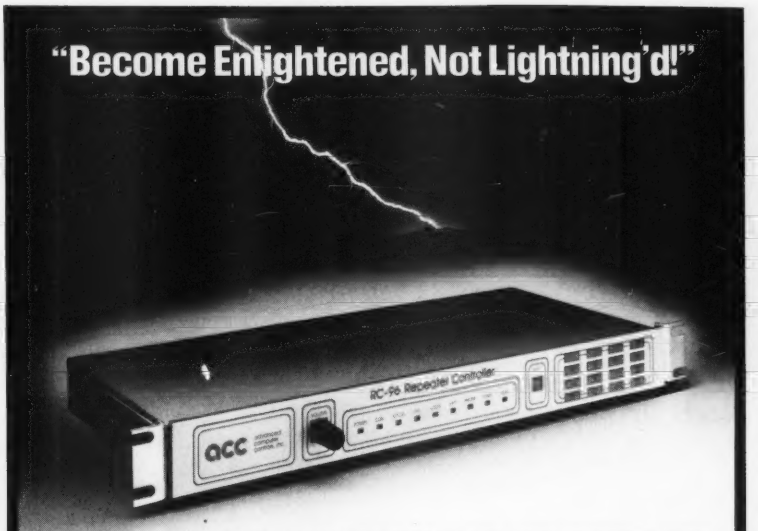
"Become Enlightened, Not Lightning'd!"



Flash! The RC-96 Repeater Controller two year warranty now includes lightning coverage.

The '96 is tough. A three-terminal gas discharge tube across the phone line and transient supressors on each input and output signal stop lightning from taking your system down. The '96 is so well protected that its proven performance in the field allows us to offer two year warranty coverage which includes damage caused by lightning!

You'll hear thunderous applause when you install a '96 controller on your repeater. Remote programming will let you easily make changes to your repeater from anywhere without a trip to the hill. Change codes, autodial numbers, ID and tail messages and more, with reliable storage in E²PROM memory.

Your users will be thunderstruck by the outstanding patch and autodialer, with room for 200 phone numbers. The talking S-meter will let them check their signal strength into the repeater. Remote base support for up to six bands allows linking your repeater to others. Plus support for pocket pagers and a bulletin board.

Your technical crew will light up when they see the built-in keypad and indicators. And the ease of hookup with shielded DIN cables. With pots and DIP switches easily accessible at the rear of the unit.

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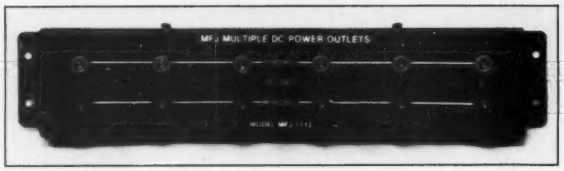
CIRCLE 1 ON READER SERVICE CARD

Continued from p. 62

troller. It provides serial output of all 16 DTMF tones for computer use.

The Signal Sentry is priced at $90 for the assembled and tested unit (#173-ASY) and $70 for the kit version (#173-KIT), plus $3.50 S & H per order. Each unit comes with an 18-page instruction manual. Contact *A & A Engineering, 2521 W. LaPalma, Unit K, Anaheim CA 92801. (714) 952–2114.* Or circle Reader Service No. 202.



MFJ

The new MFJ-1112 Multiple DC Power Outlet saves you space and money by giving you six pairs of heavy-duty binding posts for connecting your accessories. It connects directly to your 12 VDC power supply. RF bypassing keeps RF out of the power supply from the DC line outlet. The cabinet measures 13½″ x 2¾″ x 2½″. You also get MFJ's one-year guarantee.

The price is $25. Contact *MFJ, P.O. Box 494, Mississippi State MS 39762. (601) 323–5869, (800) 647–1800.* Or circle Reader Service No. 208.

CUSHCRAFT CORP.

The CS28M magmount antenna is an ideal companion for a 10 meter mobile transceiver. It is a new adaptation of the Cushcraft/Signals mobile antennas recognized by professional users around the world for their rugged looks and dependability. The antenna comes with a 49″ stainless steel whip and spring, a standard ¾″ (brass base) 90 pound pull, chrome-plated magnet, Mylar™ pad and 15 feet of quality RG58AU with PL259 connector.

The suggested retail price is $60. Contact *Cushcraft Corporation. P.O. Box 4680, 48 Perimeter Road, Manchester NH 03108. (603) 627–7877.* Or circle Reader Service No. 209.

J.I.M. Professional Series

The J.I.M. M100 low-noise wideband GaAsFET preamplifier covers the frequency range from 24 MHz to 2150 MHz. To ensure best possible performance, three switchable bandpass filters are included. With full built-in RF switching, this preamplifier is suitable for both receive and transmit applications. It has BNC connectors that let you connect simply to your favorite transceivers, scanning receivers, handhelds, etc., and to the existing antenna on top of the unit. The M100 will also be of interest to the technician because it can be used with oscilloscopes, spectrum analyzers and similar test equipment.

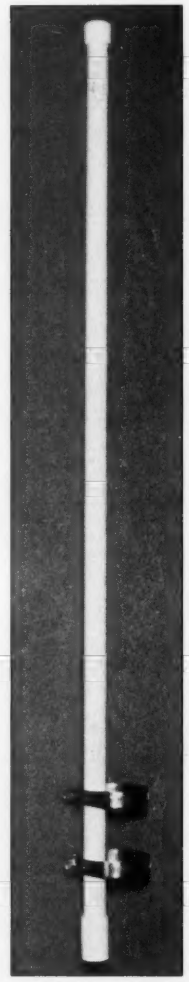
The suggested retail price is US$114. Contact *NEVADA, 189 London Road, North End, Portsmouth, Hampshire P02 9AE, U.K.; FAX: (0705) 690626.*

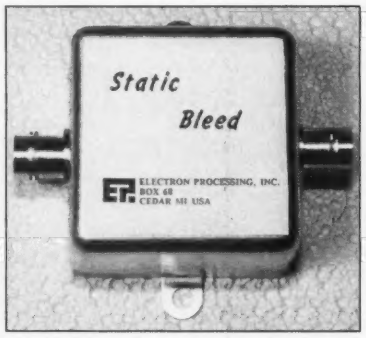
ELECTRON PROCESSING, INC.

The Scanner Stick from Electron Processing, Inc. is a low cost, quality antenna designed to provide scanner owners with excellent reception in an antenna that won't come apart the first windy day. The Scanner Stick receives all popular scanner frequencies between 30 and 1000 MHz. It is encased in a continuous PVC tube. It is only 35″ long and comes completely assembled with mounting clamps for masts up to 2″ in diameter. A female UHF socket (mate to PL259) is provided for connection to your antenna feedline.

The Static Bleed, also from Electron Processing, Inc., is designed to shunt to ground the high voltages that can develop on wire antennas, causing arcing, poor reception, and/or equipment damage. It works on antenna systems from 0.1 MHz to 30 MHz. Simply connect the antenna cable and ground wire. No power source is necessary for operation.

The Scanner Stick and the Static Bleed are priced at $30 each, with quantity discounts available. Contact *Electron Processing, Inc., P.O. Box 68, Cedar MI 49621. (616) 228–7020.* Or circle Reader Service No. 207.



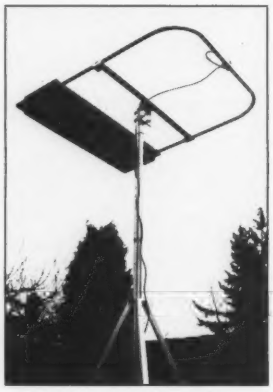


AEA

The new AEA HF IsoLoop™ antenna's compact design makes it an ideal attic or balconey antenna. It is square and measures three feet per side. The small size makes it ideal for portable operation. Its balanced feed system prevents feedline radiation, reducing the potential for interference.

The IsoLoop tunes continuously from 14 to 30 MHz and is rated to 150 watts. Typical SWR is 1.5:1 or less over the entire frequency range, depending on the immediate environment. The antenna is tuned remotely and the control box is supplied with the antenna.

The suggested retail price for the IsoLoop is $380. For more information contact *AEA, 2006-196th St. SW, P.O. Box 2160, Lynnwood WA 98036. (206) 775–7373.* Or circle Reader Service No. 205.



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Memories

Dr. Hess takes a look backward for the seventh time.

by Dr. William C. Hess W6CK

[The subtitle of this article refers to the fact that Dr. Hess has authored six previous articles for 73, all with a nostalgic theme and a special emphasis on the fantastic and flamboyant early-day operation of radio station KGCX. The efforts of the owner of that station to deceive the United States Government regarding the operation of KGCX, which even included the staging of "masquerades" constitutes hilarious and interesting reading, apparently greatly enjoyed by our readers, judging by their responses in our "Letters to the Editor" section, and the fact that they wrote from all over the world and awarded a $100 First Prize for the best article in the June, 1979 issue, to Dr. Hess.—Ed.]

In 1943, I was still employed by the Great Northern Railway as a station agent and telegrapher in North Dakota, earning the princely sum of sixty-six cents for every hour worked. "Worked" may be a poor choice of words, since only 30 minutes per day was all that was required to do the work at a small station.

I was already a college graduate and had plans to enter some profession in which my labor would be more handsomely rewarded, if I resumed my education and attended graduate school for an additional four years.

All railroads were suffering a terrific shortage of telegraphers and station agents. Most of the agents were drafted into the armed services. The situation became so acute that any man who, as a Boy Scout, had learned the International Morse code, was considered a candidate for employment as a telegrapher. Unfortunately, in that type of code, eleven letters of the alphabet were represented by a different combination of dots and dashes. The American Morse code was used by the railroads ever since the invention of telegraphy in 1844. Apparently, these men who had been slightly trained in the Boy Scout code, were expected to decipher the eleven different letters of the American code by some mysterious process, such as clairvoyance.

One summer, a man visited his uncle, who was a railroad station agent. His uncle made no claim whatsoever to having been trained in any code known to man, and vigorously denied knowing anything about a station agent's duties. He was nevertheless hired as a station agent because he had been *exposed* to a railroad for three months, and like a pair of spectacles with both lenses missing, was still better than nothing at all.

When a very elderly man named Willheimer, who actually had once been a Western Union telegrapher, showed up at the Minot, North Dakota headquarters of the Great Northern, officials there looked heavenward and gave thanks to the Supreme Being. Mr. Willheimer was given a sketchy examination and dispatched on the first available train to Pillsbury, North Dakota. This station had lacked an agent to supervise it for the past month, since all the unassigned agents and telegraphers had gone to war.

Mr. Willheimer quickly proceeded to establish one of the most consistent records ever compiled by a railroad agent. Everything he did was absolutely, incredibly wrong. In addition, his record is also unique in another respect: He was the only Great Northern Railroad agent ever to establish a cafeteria in a depot. All depots of that railroad were built with a wooden molding about 3 inches wide which projected from the inside walls. If one desired to set a standard size can of vegetables, fruit, etc., on this molding, it was just the right width for that purpose. Mr. Willheimer so desired, and after he had resided in the depot for a couple of months, where he slept and prepared his own meals, the molding in its entire length of the office was completely loaded with partially opened cans of vegetables and fruit.

Clever Mr. Willheimer did not completely cut the top of each can out with his can opener, but instead left about an inch of metal intact on each can cover to serve as a "hinge." The can cover could be raised to the necessary level to seal the can again. The moldings were about four feet above the floor. So, when it was time for breakfast, lunch, or dinner, all the old gent had to do was to grab a teaspoon and walk down the cafeteria line. He would sample a couple of spoons of pork and beans, a portion of sliced beets a little further on, ad infinitum until he reached the dessert section at the end of the line. There he could enjoy some Queen Anne cherries or perhaps some crushed pineapple topped with a Maraschino cherry to complete his meal.

He never had any dishes to wash; all he had to do was take a small piece of the toilet tissue, provided by the railroad and "dry clean" the spoon he had used.

No housewife in history has ever simplified the process of easily preparing meals to the degree that Mr. Willheimer did. Nor has any housewife ever been able to offer the tremendous variety of foods at any one meal, such as was available at the Willheimer Cafeteria.

From afar, I can hear some reader say, "That idea wouldn't work. The food in the cans would spoil in a day or two."

No, it would **not.** Not in the cold climate of North Dakota, unless it was July and August and perhaps late June and early September. Mr. Willheimer's cafeteria operated during the cold months of October, November, December, and January 1944, when it suddenly ceased operations, for reasons which will be explained shortly. A Mr. Kneisel (of whom more mention will be made later) once performed an experiment in the depot at Palermo, North Dakota, where he was the station agent. That depot was one of many which stood on pilings (conveniently

made from telegrapher poles) about six feet or more high, so that the station platform would be on the same level as the railroad track. If the outdoor temperature on a winter day was thirty degrees below zero, the wind chill factor, caused by the ever-present northwest wind blowing under the depot floor, decreased it to about seventy degrees below zero.

Kneisel fired up the lignite coal stove in "his" depot until the stove pipe glowed cherry red. He then placed a tomato can full of water in the corner of the waiting room furthest from the stove. It wasn't long before a layer of ice appeared on the top of the can, and later the water froze into a solid block of ice.

Seated in the telegrapher's chair, with the chair in just the right spot, a person could look up through a hole in the ceiling of the depot and see the stars in the Dakota sky.

So, it is readily apparent that Willheimer's canned fruits and vegetables were along the cold walls of the Pillsbury depot. During the fall and winter, the food was in more danger of freezing than it was of spoiling. Elevated from the ice cold floor, the temperature of the food probably remained at around forty degrees, an ideal temperture for food storage.

Finally, Mr. Willheimer's misdeeds in the performance of his duties reached a level which the railroad could no longer tolerate. Yes, they were still desperately in need of station agents. But they weren't *that* desperate, so they gave Mr. Willheimer a considerably less than Honorable Discharge and told him, "Please, please don't ever apply for employment anywhere on the Great Northern again."

Thus, Mr. Willheimer's shaky voice vanished from the Dispatcher's telephone, and his equally shaky sending on the telegraph circuits, was heard no more.

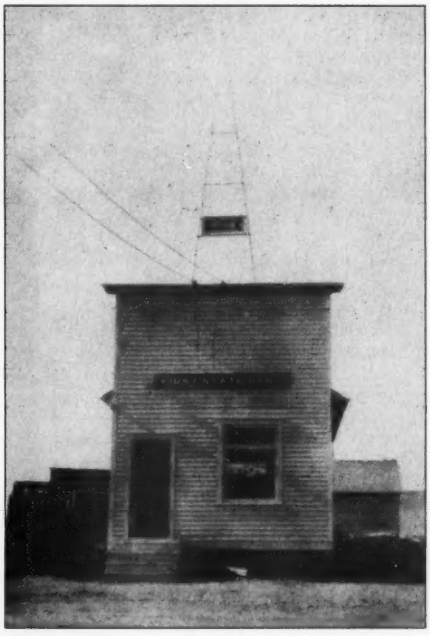
By the very strangest of coincidences, almost at the same time that the Great Northern said farewell to Mr. Willheimer, a Traveling Auditor (of which there were about ten on the G.N. system) retired. The man appointed to take his place was named Wiltheimer.

A Traveling Auditor's position is above the status and salary of a station agent. It includes a lovely expense account to cover the costs of constant traveling, hotel rooms, meals, etc. The accounts of every station in the whole railroad system needed to be checked by the auditor.

The amazing similarity between the names Willheimer and Wiltheimer presented just too great an opportunity for me not to have some fun with this situation.

In addition to each station having a couple of telegraph circuits, the stations on the main lines had a telephone system known as the "message phone." These telephone lines were owned 100% by the railroad and had nothing whatsoever to do with the Bell System or General Telephone. On these telephone lines, one listened through a leather-covered spring steel headband with a single headphone attached. To speak, one trompped on a foot switch that was conveniently located beneath the telegraph table. When this line was not being used for official business, it could (like a farmer's telephone line) be used by any number of station agents for "caboose track talk" (discussion of current events on the railroad).

One afternoon, a group of four agents, including myself, were "gossipping" on the line. During all of Mr. Kneisel long years on the railroad he had had great ambitions of becoming a Traveling Auditor. He was well-posted on all aspects of Station Accounting and was 110% honest. In short, the railroad could not have found a better man anywhere to promote to the position of Traveling Auditor. However, in gaining promotion on any railroad, it was largely a matter of *who* you knew, rather than *how much* you knew.



This ridiculous picture is the result of Ed Krebsbach and Joe Jacobs having seen radio station towers mounted on top of fifteen story buildings in their travels to Seattle, Minneapolis, etc. and "wanting to be just like the big boys" straddled this old farm windmill tower on the peaked roof of the tiny Vida bank.

The subject of the telephone conversation took place shortly after Mr. Willheimer was disconnected from the Great Northern's payroll. Seeking to have some fun, I said to the other three men listening on the message phone, "What do you fellows think of the company appointing that guy who was at Pillsbury **Traveling Auditor?**"

Mr. Kneisel, agent at the station next to mine, shouted **"What!"** so loudly into the telephone mouthpiece I might have heard him without benefit of the telephone.

I said, "Sure, he is going to be the new Traveling Auditor." All three men expressed disbelief that this could possibly be true, whereupon I said "You don't hear him on the phones or telegraph wires any more?" They had to admit this was true, and I then said "Of course not, he's gone to St. Paul to learn the auditor's code (a system of code words, such as 'tabasco,' which has a hidden meaning to the Chief Auditor in St. Paul), and to get a Jim Clinton suit, and an auditor's briefcase. Furthermore, he will be out here checking up on you guys soon."

The listening men still expressed doubt that Mr. Willheimer could have ever been promoted to such an exalted position while poor Mr. Kneisel's talents remained unrecognized. I said, "All right, you guys, listen to the telegraph wire and I'll prove it to you."

At that time, John Atkinson, a friend of mine, was employed in the railroad's Minot Relay Office, a railroad message center. He was privy to messages concerning almost everything that was occurring on the railroad, and thus was well-informed about promotions, etc. We used to send telegraph messages to each other at a high rate of speed, perhaps fifty words per minute.

When I told my three friends on the message phone to listen to the telegraph circuit, Atkinson happened to be on one of the circuits calling a station for which he had a message. I broke in on the circuit and asked, "John, what's the name of the new auditor that's just been appointed?" Atkinson ripped the name "Wiltheimer" back at fifty words per minute.

In American Morse code, the letter "T" is represented by a single dash, while the letter "L" is represented by a slightly longer dash. The three men listening on both the telephone and the telegraph were good to average telegraphers, but they failed to notice the very slight difference between the words "Willheimer and Wilteimer," especially when sent at a high rate of speed they never used themselves.

I then returned to the telephone and said to the men, "Well, do you believe me now? You heard it direct from headquarters, didn't you?" They agreed it must be true.

I continued the conversation by saying, "Now, in the future when I tell you guys something, I don't want you to argue with me about it. If I tell you that a pony can pull a freight train, don't start arguing with me about it, just find the harness and hitch him up."

Mr. Kneisel tossed and turned in his sleep and slept very poorly for about three weeks until an Official Bulletin was issued by the railroad announcing that a Mr. Wiltheimer (not Willheimer) had been appointed Traveling Auditor. Of course, the first name and initial of the man were different from that of the ancient gent who had been at Pillsbury. Mr. Kneisel realized he had been the victim of a practical joke.

Adventures of Joe Jacobs

Joe Jacobs, a young man living on his father's ranch in eastern Montana, was keen of mind and hand. He was to become well known in the upper Midwest for his inven-

tions of the Jacobs Windcharger and the Frye service station gasoline pump. Admiral Byrd took Jacobs Windchargers with him on his expeditions to the South Pole. His brother, Marcellus, was also of an inventive nature, and eventually the brothers were granted a total of thirty US patents. They established a factory in Minneapolis with 200 employees. During the years of operation, it sold some twenty million dollars' worth of windchargers, an impressive accomplishment, all stemming from the tinkering of two young men with windchargers on a ranch in Montana.

In 1924, Joe built a 7½ watt transmitter and operated it on the ranch. It was on the standard broadcast band without benefit of a government license. No call letters were used; the station came on the air with the announcement that "This is the Voice of Cow Creek," and the brothers rang a cow bell frequently during the broadcasts. Their broadcast music was produced by holding the single-button mike in front of the family Victrola. During this year of illegal operation, Joe was not fined $500 nor imprisoned for six months as the law provides and in fact, he never heard a word from the Federal government.

In October 1925, he sold the illegitimate station to E.E. Krebsbach, the village banker in the nearby hamlet of Vida (population, 25) for $125. About the same time, a druggist in a nearby town sold Atwater Kent radios in his drug store. The druggist was displeased with the competition provided by the Jacobs brothers (they built radios on the ranch and sold them, thereby assuring themselves of listeners), and wrote to the Department of Commerce in Seattle informing them that an unlicensed radio station was operating in Vida, Montana.

At that time, the Department of Commerce supervised radio stations. The net result was the loss of Joe's two-letter call, 7 TF, but he was not otherwise punished. However, Krebsbach induced all his friends to write to the Radio Inspector in Seattle, describing how terribly bad Jacobs felt about the loss of his ham license, and in about two weeks, Joe's license was given back to him, though with the less desirable call letters 7AHN. Nothing whatsoever was done to Krebsbach, and he kept right on broadcasting for an additional year without benefit of station license nor a licensed First Class operator. In October 1926, he secured a license seven days after applying for it, with the call letters KGCX.

Krebsbach received a telegram in May 1928, from the Radio Inspector at Seattle. It read that he would arrive in Vida in three days to inspect KGCX radio station. This was cause for *panic time* in the Krebsbach home, since KGCX did not have a licensed First Class operator as required by law.

Understandably alarmed, Krebsbach summoned a young man named Johnson, who held the required license, to come to Vida and pretend that he was KGCX's resident engineer.

Johnson lived in Havre, Montana, 231 miles from Vida. His presence in Vida had to be explained logically somehow to the Inspector, since KGCX was only on the air one hour per day, and had no commercials and no income.

Krebsbach and the village storekeeper "invented" a job for Johnson. He was wrapped in a grocer's apron and put to work busily selling groceries in a store. Shortly before noon, when it was time for KGCX's daily one-hour broadcast, Johnson trudged the short distance from the village store to the bank where KGCX was located. He was still dressed in his bogus grocer's apron to give the Inspector the impression that he worked full time in the village store except for the one hour each day he was required to be on duty at the radio station.

Joe Jacobs took his First Class operator's examination while the Inspector was in Vida, and passed it. Johnson had to go back to the store to sell groceries all afternoon in order to play his role when his one-hour stint at KGCX was finished.

That evening, when Krebsbach, the Inspector, and Johnson (who had to return to high school at Havre) arrived at the south shore of the wide Missouri River in the outskirts of Wolf Point, Montana, the Inspector and Johnson boarded the White City Ferry, since it was making its last trip of the day across the river.

The Inspector shook hands with Krebsbach and bade him goodbye. Unfortunately, Johnson did the same. It was rather strange for a resident engineer to bid his boss goodbye without any explanation. Obviously, in order to have played his role satisfactorily, Johnson should have merely said, "See you tomorrow" to Krebsbach. It would have made it appear that he was merely going to Wolf Point for an evening of recreation, and that he would, of course, be on duty at KGCX the next day.

The Old KGCX

What would you think if you were listening to a regular broadcast station which was playing a spirited tune, such as "The Saints Go Marching In," and suddenly the tempo slowed down so much that the music sounded like a funeral dirge? You would, of course, think that something had gone wrong with the station's turntable or tape machine. But what if the announcer stated that the temperture in the studio was only zero degrees, and asked the listeners to please stand by for a few minutes while he placed the phonograph motor on the stove to warm it up and thin the oil? Would you wonder what kind of a cockamania radio station you were listening to? Of course you would. But that is exactly the announcement you would often hear if you were listening to KGCX at Vida during the winters of 1925 through 1928.

Now let Mr. Krebsbach tell you in his own words about some of the trials and tribulations of operating his peanut-whistle radio station at Vida. "When the station went 'haywire,' Mr. Jacobs would come up from the ranch and put it in operation again. We were fortunate to have only about one breakdown every six months or so. While the operation was a novelty for a while, it soon became a strain on the nerves, my pocket book, and everything else, including the good wife. Day after day, I would eat my meals on the run, always with my pocket watch on the dinner table, watching for the time of 12:15 to arrive. Very often, I would not have finished my meal and would run into the transmitter room, throw the switch and put on a phonograph record and go back to finish my lunch.

"Everything went fairly smoothly until the colder weather arrived. We had the transmitter set up in one of the unheated rooms at the back of the bank, and it may have as well been set up at the North Pole, for all the torture from the cold that I suffered from during the broadcasts. The most trouble was with the phonograph. At first, we operated it with the mechanism inside the phonograph cabinet, but when the temperture in the room got down to zero degrees, it was necessary to remove the mechanism and place it on a table. It could be handled easily and set on the stove just before broadcast time to 'thaw out' the heavy oil. Even so, when it was really cold outside, a 'time out' was said, and the thing was set on the stove again for a while."

KGCX moved from Vida to Wolf Point in 1929, and from Wolf Point to Sidney, Montana, in 1942 with its respected five-kilowatt operation. It has enjoyed prosperity since World War II, a condition to which it was not accustomed previously in its life.

The electrical power in the North Dakota town in which I was born was somewhat substandard, since it was 110 volts DC and only "on" from sunset to midnight, when it would "flicker" twice as a warning that it would cease entirely in two minutes after midnight.

If one acted extremely quickly, it was possible during earlier hours of the evening to turn off the switch on the drop-cord hanging in the center of one's bedroom and jump into bed before the illumination ceased, since the carbon filaments in the lamp bulbs used at that time still provided some light while they were cooling off, even though the "juice" had been turned off.

Monday and Tuesday mornings, the current was on so that housewives could do their washing and ironing.

The DC generator at the light plant could light the whole town satisfactorily, but it wasn't powerful enough to do that and at the same time operate the carbon arc light in the movie projector at the local theater. Since the same man owned both the light plant and the theater, the movies were shown on Saturday evenings. The owner would open a big knife switch, cutting off the electricity to the western half of the town, while the following Saturday the eastern side of town was cut off.

At that time (circa 1915), radio was not the main event of North Dakota or practically anywhere else. The main entertainment of the area was "card parties" with, of course, refreshments being served about midnight.

To those residents of the town who complained bitterly to the light plant owner about the lack of electricity the previous Saturday evening, he had a ready answer: "It's all your own fault—you were supposed to be at the movies!!!" 73

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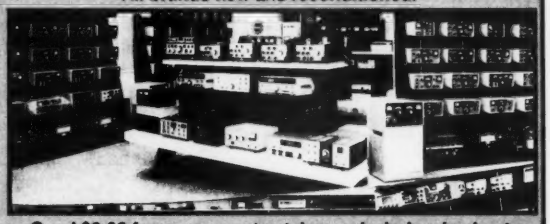

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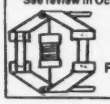

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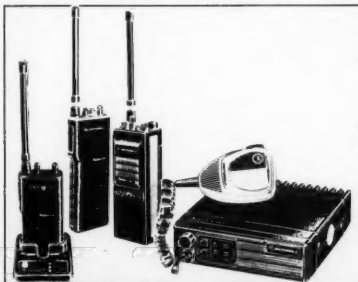

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CW EPROM Keyer

I hope the information I provided in the last two issues on basic gain blocks got you in the building mood. You can build so many different things using MMIC amplifiers, it can make your head swim. Recently, Kerry N6IZW, a member of our group, has tried placing several amplifiers in series, building up about 80 dB of gain. The internal noise built up by this string of amplifiers can be used as a signal source for testing with a spectrum analyzer. When connected to a test circuit, the response curve is displayed on the analyzer as if you were using a sweeper.

News from my shack includes some great openings on 6 meters, and new test equipment. The latter was mostly constructed from bargain items in dire need of repair. The price can be very attractive, especially when the unit is fully restored to operating condition.

A good example is my HP-5360 frequency counter, picked up at a flea market. I just located the last item needed for complete operation of the counter: a 5375A keyboard, which Kerry N6IZW repaired. With the keyboard, the HP-5360 is capable of doing program calculations using all three ports on the counter. Input A is good to 10 MHz, B is good to 320 MHz, and the plug-in is good up to 18 GHz. This counter has proven to be quite valuable on numerous projects. It was used extensively to develop a phase-lock circuit to stabilize the Frequency West "Brick" type microwave oscillators to within 100 Hz at 10 GHz. We are in the process of writing up an article on the phase-lock circuit, and will have it out soon.

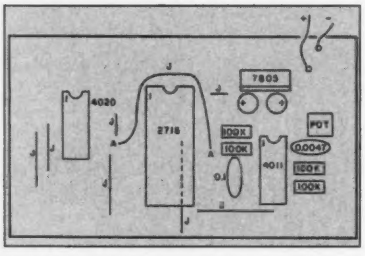

Figure 2. Parts placement, component side.

Programmable CW IDer

This month I'll describe a simple, one-evening construction project that can be used on your microwave wideband FM transceiver. The unit is a CW IDer that can be custom programmed with your callsign. You can use this reliable unit with many different types of microwave transmitters or on a remote beacon.

First, some background. Normally, the microwave carrier is transmitted to a distant location in a first attempt to set up communications. The receiving end rotates his antenna back and forth, trying to locate the signal. In many cases the signal being detected is quite weak due to path loss and highly directive dish antennas that are not in proper alignment with each other.

The mechanical alignment is set up with maps and compass bearings to the distant station. You can check vertical alignment with the horizon by trying to copy local beacons, if available. Another method is to attach a small sight tube to your dish to confirm horizon alignment. These methods all combine to help remove pointing errors. Now you are down to the real nitty-gritty of finding the distant signal in the noise. After listening so long to noise, you begin to hear signals that are not there. I guess this could be called the post mental DX depression.

Finding Signals in the Noise

Since signals in the noise are difficult to locate, we use tones to aid location. When a signal is modulated with something other than voice or CW, such as a solid or fluttering tone, it can be found at very low levels and enhances the microwave signal. Mechanically adjust your antenna until you're receiving the strongest signal, then request that the other station make small adjustments in his antenna alignment, hopefully to improve signal strength further. This usually takes about two or three orientations. When the antennas have been properly aligned, you can switch to voice modulation or CW for identification and confirmation. This streamlines contest operation. Running the CW IDer lets others know who the signals belong to. When many stations operate near each other, it promotes a good neighbor policy.

So let's get on with the construction of the CW IDer. The meat and potatoes of the IDer is contained in a preprogrammed 2716 EPROM. This EPROM contains your callsign and a reset command to give a constantly repeating CW output spaced every 15 to 30 seconds. The advantage in using this EPROM is that you can turn the power off, and your program is still resident in the chip. Applying DC power activates your program. Change the EPROM with a differently programmed EPROM and you change your message.

Other types of ID systems are more complex and require you to key in your callsign each time you wish to use it. When power is turned off, you must reset the message. Also, these units are a little larger because of memory storage. I feel the EPROM is the way to go because it's inexpensive, small, and easy to build. For those who don't build from scratch, I will make a kit of parts available with PC board and preprogrammed EPROM.

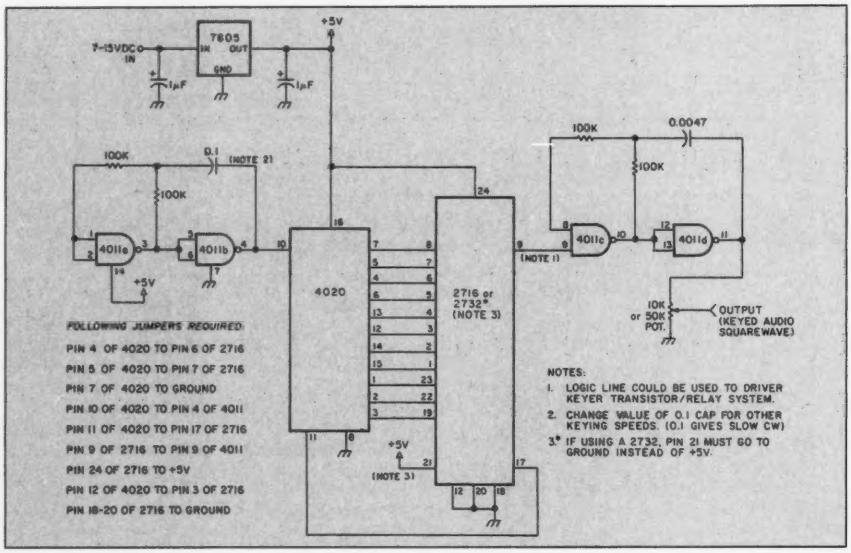
7-15VDC IN
7805
IN OUT
GND
+5V
1µF
1µF
100K
0.1
(NOTE 2)
100K
100K
0.0047
100K
4011a
4011b
4011c
4011d
4020
2716 or 2732* (NOTE 3)
(NOTE 1)
+5V
(NOTE 3)
10K or 50K POT.
OUTPUT (KEYED AUDIO SQUARE WAVE)
FOLLOWING JUMPERS REQUIRED:
PIN 4 OF 4020 TO PIN 6 OF 2716
PIN 5 OF 4020 TO PIN 7 OF 2716
PIN 7 OF 4020 TO GROUND
PIN 10 OF 4020 TO PIN 4 OF 4011
PIN 11 OF 4020 TO PIN 17 OF 2716
PIN 9 OF 2716 TO PIN 9 OF 4011
PIN 24 OF 2716 TO +5V
PIN 12 OF 4020 TO PIN 3 OF 2716
PIN 18-20 OF 2716 TO GROUND
NOTES:
1. LOGIC LINE COULD BE USED TO DRIVER KEYER TRANSISTOR/RELAY SYSTEM.
2. CHANGE VALUE OF 0.1 CAP FOR OTHER KEYING SPEEDS. (0.1 GIVES SLOW CW)
3* IF USING A 2732, PIN 21 MUST GO TO GROUND INSTEAD OF +5V.

Figure 1. Circuit for the CW IDer.

The EPROM is programmed in serial format. The data is clocked out in the same manner by the 4020 ripple counter chip, and the speed is set by the clock rate. The scheme used is three bits equal a "dah," while one bit is a "dit." Letters are spaced by 4 data bits, and word separation is equal to 7 bits. In Table 1 is an example of the programming for my callsign.

How the Circuit Works

The clock is made from two sections of a 4011 NAND gate. The speed is set

Continued on page 73

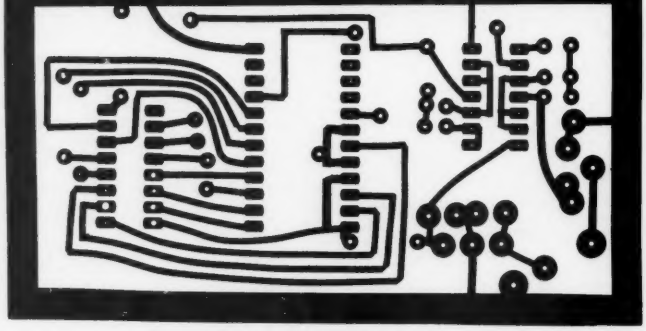

Figure 3. Foil diagram, 1:1 in size.

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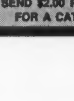

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Above and Beyond

Continued from page 70

by the 100k ohm resistor and the 0.1 µF capacitor. Increasing the capacitor's value will decrease speed. This clock drives the 4020 ripple counter, causing the EPROM to dump its data serially. When the full string of data is dumped, such as *De WB6IGP*, an additional amount of following bits are stuffed with zeros. Generally I use about 40 bits, giving a silent period of about 10 seconds, and finish up with a code "80" input as data on the last bit to be used. This is the reset signal that starts the entire sequence over again. The other two NAND gates form an audio oscillator that is keyed on and off by the data from the EPROM. A "1" or "high" turns on the oscillator, and a "0" or "low" turns it off.

The beauty of this circuit is that the power can be turned off at any time and turned on later, restarting the CW cycle. You can identify your station quickly with a simple switching scheme.

Next month, to complete the package, I'll give the schematic for the warble tone oscillator. This unit is capable of producing the solid tone as well.

If you don't want to go through this mental balancing act of programming an EPROM and making a PC board, I will make a kit available with the board etched and ready to drill. This includes the 2716 EPROM programmed with your callsign in a format similar to that in Table 1. Variations include callsign/B for beacon service. You can program other messages, but the callsign and beacon formats are standard. The kit is $12.50 US postage paid from WB6IGP.

Mailbox Comments

Alan Rutz WA9GKA has been providing amateurs with 10 GHz microwave devices from his company, SHF Microwave Parts. Alan writes that he is running out of surplus GUNN oscillator detector units, but he has made arrangements with a GUNN manufacturer for new and used devices and information on sources. Contact Alan at: 7102 W 500 S., La Porte IN 46350.

Alan described an ATV experiment he recently finished. He replaced the electrolytic capacitor (needed to bypass the GUNN against low frequency oscillations) with a low impedance transistor. This transistor driver stage was able to provide Alan with 7 MHz bandwidth, flat within 3 dB. He was quite surprised to be able to obtain such a wide modulating bandwidth, especially with some of the very inexpensive GUNN units.

Russell in Holly, New York, is trying to locate inexpensive 22.2 GHz oscillators to test cavities. Well, Russell, that's a tough one. I know of several manufactures of 24 GHz oscillators, but the price is much higher than most experimenters would want to pay, including me. Any help out there on where to locate 22 to 24 GHz equipment? If so, drop me a line, or write: Russell Robertson, 4242 Holley Byron Rd., Holly NY 14470.

Bill N6OLD writes, "I'm experimenting with some of the California Microwave 'brick' oscillators, and have run into a few snags. I'm interested in obtaining a schematic for the phase-lock detector part of the brick. My phase detector works fine; there's enough signal that I can see the IF go thru zero beat with my scope as I vary the tune voltage. All I need now is to repair the place where the IF goes to to complete the loop. Also, if you have a crystal supplier that you recommend for the brick crystals, that would help out."

Well, Bill, I am tearing apart several California Microwave bricks and developing the schematic as I go. These three different California Microwave brick oscillators all have very similar crystal oscillator boards and drive circuitry, but all the phase-lock boards are different. I suspect the schematic will be developed shortly. Part of the problem is that California Microwave used a custom house numbered chip which I'll have to probe to determine just what is going on. It looks like a standard op amp can be used as a replacement, but this has not been tested yet. If any of you have information on this brick, I would be interested hearing from you.

Now a brief review of brick oscillators: Microwave brick oscillators are very desirable because they require little modification, and they're far cheaper than building a comparable microwave oscillator. The basic brick uses a three-stage 100 MHz crystal oscillator, coupled into a mixer circuit. The high power oscillator (about 1700 MHz) is phase-locked to the 100 MHz crystal. The mixer feeds a video amplifier IC which controls a varactor in the high power oscillator cavity. When phase-locked, the high power is a direct multiple of the 100 MHz (approximately) crystal oscillator frequency. This is multiplied in a varactor multiplier to the 10 GHz frequency range and filtered on its output. Crystals for the 100 MHz oscillator were obtained from International Crystal for about $18 each. Specify part #585132 for the Frequency West type MS-54XOL "Bricks." (More details later.)

Let's hear from you regarding new projects you would like to see developed. Or you could share something you have constructed, or send pictures of microwave VHF/UHF activities. As always I welcome questions and will answer ASAP. For a prompt reply, please enclose an SASE. 73, WB6IGP.

Table 1.
E-prom Programming Example "De WB6IGP"

D=1110101	SPACE=0000	E=01	WORDSPACE=0000000
W=0101110111	SPACE=0000	B=111010101	
SPACE=0000	6=11101010101	SPACE=0000I=0101	
SPACE=0000	G=111011101	SPACE=0000P=010111011101	

LONGSPACE=00 (40 OR SO "0" BITS), and RESET BIT=80.

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73 INTERNATIONAL

edited by C.C.C.

Arnie Johnson N1BAC
103 Old Homestead Hwy.
N. Swanzey NH 03431

Notes from FN42

I have sad news this month. Last March, Gerry Fox WA2VKS relayed to me that Ken Gott VK3AKU is now a Silent Key. Ken is well-known to 73 readers as Hambassador to Australia, and to the world as the WIA Awards Manager. He was very active on the 14.226 family net, and an all-around contester and DXer. We will sorely miss him. I received a chatty letter from Ken in February, and it is printed in this column as a tribute to him. The new WIA Awards Manager will be Ken VK5QW.—Arnie N1BAC.

ROUNDUP

Denmark *From Ragnar Otterstad LA5HE/OZ8RO.* The success story behind the recent release of 18 and 24 MHz to the amateur service started some 14 years ago.

Over 180 countries are now members of the International Telecommunications Union (ITU), based in Geneva, Switzerland. Every 15 or 20 years there is a major conference to look at the frequency allocations for the numerous users of the frequency spectrum. The ITU undertakes, as an agency of the United Nations, to coordinate such work.

There are 36 services in addition to the Amateur Radio Service. Some of the more well-known are: Fixed, Mobile, Broadcast, and Radio Location. Many of the radio services could use more spectrum, and as the aspirations of people all over the world change, so do their requirements for frequencies.

Many important factors influence the political and commercial pressures on the radio spectrum. For example, when there are satellite communication problems, many governments and organizations turn their eyes to the HF spectrum. With such enormous global pressures at work, it is perhaps quite surprising that the amateur service has any bands at all! The fact that we do is because of the high reputation of radio amateurs for international goodwill and public service—especially for their technical achievements and during times of need.

At the last World Administrative Radio Conference (WARC) in 1978, the amateur service gained in principle three new HF bands and many new microwave allocations. This success, for it was a great success, was due to the efforts of linking together all of the national societies. The 1979 success in winning new allocations was also due to the IARU Observer Team that spent three months in Geneva! It countered every move which was considered negative, and put forward every positive aspect of amateur radio for its benefit.

Now some excellent work by fellow amateurs volunteers, started 14 years ago, has finally reached fruition in the shape of the release of the 18 and 24 MHz bands. The moral of this story is a simple one and it concerns good long-term planning, faith in the future, and patience!

As one of the national societies of the world, it is imperative that your IARU society is strongly supported by the local ham population. Think how much more the society could do if all amateurs were members. We all know someone who is not a member, for one reason or the other—often because of a conflict of opinion with the local society several years ago, the ham has never renewed membership. But all hams continue to benefit from the society's work. Remember, the higher the membership, the stronger the representation, and the stronger the representation, the more substantial the argument.

A freeloader is someone who freely accepts all the benefits that a national society obtains or provides for the amateur service—new bands and modes, QSL bureau, liaison with licensing authorities, international representation, etc.—without paying for these services.

After all, if the resources needed to obtain new bands or preserve existing frequency allocations were paid for by larger numbers of people, each person would have to pay less! The next ITU conference to deal with frequency allocations is scheduled for 1992. Think about it!

[I have never been one to say that anyone has to belong to any organization, but I truly believe that organizations doing good things for me should be supported by me. Hams in the United States have found that commercial interests are a strong power when they want some frequency spectrum. In 1992 we are talking not just about the USA, but the world. As Rag states, "Think about it," and I would like to add, "And do something about it!"—Arnie]

Japan *From the Tokyo International Amateur Radio Association (TIARA):* There is a club for foreign hams in Japan! If you will be in the Tokyo area, you are cordially invited to visit and/or join TIARA.

TIARA was formed in 1972 by two Englishmen and two Americans with the purpose of assisting foreign hams who want to operate in Japan. Currently, we have about 80 members, both foreign and Japanese. TIARA supports all efforts toward reciprocal licensing, including the need for fair and equitable licensing fees.

Foreign radio amateurs or persons interested in ham radio are invited to attend TIARA meetings and join in club activities. We meet at 1930 JST on the last Friday of every month (except August and December) at St. Alban's Church opposite Tokyo Tower. Meetings are conducted in English and are usually followed by a social get-together. This is an excellent opportunity to get acquainted with local hams regardless of how long you will be in Japan. Hope to see you there. (TIARA, PO Box 119, Akasaka, Minato-ku, Tokyo 107, Japan. TIARA Net, Wednesday, 1200Z, 21.325. When in Japan, just phone the JARL at 947–8221 for information on TIARA activities and meetings.)

TIARA Award: Last December 1989, when the Japan Amateur Radio League (JARL) celebrated its 30th anniversary, TIARA received an award for its support of amateur radio in Japan. Presenting the award was Shozo Hara JA1AN, President of JARL. Accepting the award for TIARA was President Frank Striegl 7J1AAL/KA2TNZ.

Poland *From Henryk Zwolski SP9JPA.* Where is Poland? If you ever got a QSL card from an SP (or sometimes SN, SO, SQ, SR, 3Z) station, your answer would be easy: Poland is in Europe. However, if you have a chance to talk to Polish people, they will tell you that they are still striving to be in Europe.

Drastic political changes in Eastern Europe initiated so peacefully by Poland have also influenced the amateur radio service here. Portable and mobile licenses were issued to all willing SP stations for the first time last year. The first two contest stations were heard in the 1989 CQ WW, one from Krakow (SN9C) and the other from the Poznan area (SN3A).

Licensed amateurs are no longer obliged to belong to the Polish Radioamateur Union (PZK). Independent local associations have been founded. The first one registered was the Krakow Radioamateurs Club, which continues its 60-year tradition under the same name. The club members hope to reform the national organization so that it can become a federation of partners rather than a centralized structure.

Every change requires great efforts on the part of the Polish hams. Economic chaos, the initiation of free-market economy, and the implementation of human rights require assistance for the new democracy. Will it find its way to the young entrepreneurs in Krakow who have to survive and finally develop their club activities?

We have proposed several projects emphasizing the training and involvement of youngsters, which were successfully carried out in Jordan after Wayne Greene's encouragement there some twenty years ago.

The Krakow Club members are experienced in contest operations, special event stations (SN10JP, SN70KRA, SQ0DXC), certificates (the Cracovia and the Child's Friend award), DXing (Cracovia DX Club) promotion (articles in local press, English phrase book for amateurs, and video programs on ham radio), technical questions (repeater to be completed soon), and national coordination (SP YL Club).

The ancient city of Krakow has many friends abroad. Krakow has nearly 20 sister cities on all the continents. What an excellent opportunity for cooperation!

Further reforms, which are expected later this year, should also revive contacts with Polish immigrants and start progress toward the Council of Europe, the international organization for the promotion of culture. We hope that the word Europe will soon lose its reference to the western part of the continent.

USSR *Info relayed by Dick Genaille W4UW:* Early last year a new radio club was formed in the USSR. The name of the organization is "Advanced Communications DX Association (ACDXA)." It was formed to promote the usual good things that radio clubs try to do, such as foster international friendship and good will, sponsor contests and expeditions, etc. The founders are Valery RA9YD and Yuri UA9YE. Both are officers of the Association.

Photo A. Shozo Hara JA1AN (left), President of JARL, presenting award to TIARA, accepted by Frank Striegl (right), 7J1AAL/KA2TNZ.

Applications and information about awards offered should be sent to the awards manager: ACDXA, PO Box 1, Barnaul 656057, USSR.

[Dick passed on the list of awards that ACDXA proposes to sponsor. There are too many to list in this column, but they will be listed on the 73 BBS in the 73 INTL Special Interest Group (SIG) as "ACDXA Awards."—Arnie]

Lithuania. News flash! The first ham convention organized by the World Lithuanian Amateur Radio Net, scheduled for early June, has been postponed. Standby for further news in the July issue of *73 Magazine*.

AUSTRALIA

Ken Gott VK3AJU
38A Lansdowne Road
St. Kilda, Victoria 3183
Australia
"Silent Key"

Here we are in February, meaning that summer vacation is over for Australians, even if there's still plenty of summer left.

This was the first time in some years that I missed a visit to uninhabited Erith Island, where a group of us go camping. It's a major exercise, since we have to take all our needs with us—everything, that is, except lobster, abalone, and fish, all of which abound in the surrounding waters. And water—we don't take any of that, since we've established storage tanks in past years.

However, DV, I'll be back there next December for a few weeks, despite the fact that its topography and other factors make it a lousy place for DX.

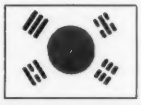
Some pix I took a few years ago on a visit to Northwest Cape provided the cover for the February issue of *Amateur Radio Monthly*. *[What a cover and view!]* Although this joint US-Australian facility is best known for its VLF facilities (and hence ability to communicate with underwater submarines) it also has good all-round HF facilities. I understand that there is a similar VLF station at Cutler, Maine (USA), and that the two between them provide global coverage.

Incidentally, VK amateurs can get special permission to operate on LF. I only know of two who have ever availed themselves of the privilege. They were restricted to CW incidentally, and while on Erith, I cooperated in some of their experiments about five years ago (listening on 300 Hz or thereabouts, and replying on 3.5 MHz). However with effective radiation of only 1% of the LF station's power, it has always seemed like a mug's game to me.

WIA membership fees are on a calendar year basis (i.e., everyone pays in January), so it won't be until April that we will know the effect of a fairly steep increase in the fee. The same applies to the new membership option—a reduced fee, but without getting the monthly AR. I'm predicting that smaller circulation = less advertising revenue = smaller magazine. But we'll need to wait until April before the situation becomes clear. Meanwhile, there's a federal council meeting on Feb 10–11, with delegates coming to Melbourne from all states. Maybe that'll provide some news for *73 Magazine*. Naturally, I'll be at the meeting with pencil poised.

Heck. Pretty soon after, I'll have to start getting ready for the annual field day contest. Having won the solo 24-hour section in 1988 and 1989, I'm out to make it three in a row. The doctors have OKed me, with a couple of caveats, but this year the idea will be to win not by working harder, but by working more cleverly . . . CHEERS—Ken.

Photo B. Byong-joo Cho HL5AP, Republic of Korea Hambassador, and his new ham shack.



REPUBLIC OF KOREA

Byong-joo Cho HL5AP
PO Box 4, Haeundae
Pusan, 612-600
Korea (South)

I am well after being sick for the last few months of 1989. I built a new 5-story building (which I call the "CQ Building") in February 1989 and my new shack has been completed, including an antenna tower on top of the building with a triband yagi and many dipoles.

I have been QRV on 10 and 18 MHz since October, and will be on 24 MHz soon with RTTY. I also have packet radio using an IBM-XT and MFJ-1278.

I am the oldest call holder in Korea, and a charter/life member of the Korea Amateur Radio League (KARL), as well as on the organization staff for KARL.

Even though it may be a little late by the time this gets printed, I send my best wishes for the New Year to all hams at *73* and worldwide from the "Land of the Morning Calm."

[The letter was written January 1, 1990, and arrived at 73 sometime after February 15, 1990. Is that speed, or what?—Arnie]

SOUTH AFRICA

Peter Strauss ZS6ET
PO Box 35461
Northcliff 2115
South Africa

On February 2, the Pretoria Branch of the South Africa Radio League (SARL) celebrated its 60th anniversary with a dinner. The Patron of the SARL, Mr. Johan de Villiers, and the SARL President, Reno Faber ZS6OF, were guests of honour.

In proposing a toast to the pioneers in telecommunications, Mr. de Villiers said that he was amazed at the technological developments that have taken place in amateur radio and the contributions that radio amateurs have made to the development of telecommunications.

In his address, Mr. Faber reminded the members of the branch of predictions he had made six months earlier, and how they had come true. Membership has increased 13.9% with new applications daily. Liaison with the Post Master General, and the services offered to SARL members, have never been better.

He expressed the appreciation to Mr. de Villiers for his encouragement and understanding, and to the officials for their cooperation in the creation of a new Novice licence, and the special concessions for groups like the Voortrekkers, Scouts and Girl Guides, to enable them to exchange messages during CQ Hou Koers and Jamboree on the Air, soon to be promulgated.

The Chairman of the South African Broadcasting Corporation Board, Prof. Christo Viljoen, addressed delegates to the Amateur Radio and Industry conference held at the Johannesburg Amateur Radio Centre on March 15 as part of Amateur Radio Week.

The conference was organised by the South African Amateur Radio Development Trust to introduce the Novice Licence concept to Industry and to enlist their support for the development of amateur radio. Professor Vilhoen discussed the important role amateur radio can play in the development of South Africa's Electronics Industry through the encouragement of young people to follow a career in that field.

[It certainly appears that the SARL is attempting to halt the decline of amateur radio license holders as reported in the February column. How about the rest of us???—Arnie.]

Radio RSA, the Voice of South Africa, broadcasted live from the SARL National Convention held on March 17. Shortwave radio personality Kathy Fitch was at the Radio RSA stand and hosted the live transmissions.

Radio amateurs licenced in their own country and planning to take up residence in South Africa for an extended period may now apply for a ZS or ZR licence, without the need to write the local examination or a CW test. This facility was in the past only available to amateurs from countries which had entered into a reciprocal agreement with South Africa. Under the new ruling, amateurs from many West and East European countries, Canada, and many countries in the Americas and the Far East including Australia and New Zealand will now be able to apply.

Applications must be addressed to the Senior Director of Telecommunications, Department of Posts and Telecommunications, Private Bag X74, Pretoria 0001. A certified copy of the original licence and, where applicable, a copy of the current receipt must be included in the application. 73

Photo C. Reno Faber ZS6OF, South Africa Radio League President.

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The *73 Flea Market*, Barter 'n' Buy, costs you peanuts (almost)—comes to 35¢ a word for individual (noncommercial) ads and $1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

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TECH TIPS

Pearls of Tech Wisdom

TS-430S Mods from KAØSUN via KB8CI PBBS

The AGC mod on the TS-430 Kenwood to run AMTOR requires three component changes. On the IF board, find and replace capacitor C-60, a 10 mF, with a 4.7 mF. Clip one of the connections on diode D-50. Replace capacitor C-164, a 0.22 mF, with a 0.1 mF ceramic. Both D-50 and C-60 are on the upper left corner of the IF board, and are also marked on the PC board. However, C-164 is not clearly marked. It is a 0.22 mF can electrolytic near the center of the IF board. It is just below and to the right of C-149, and directly right of IC-5. Looking at the back of the board, one lead of C-164 is connected to the junction of a 47kΩ resistor, R-129, and a glass diode, D-77. These two components, soldered to the back of the board, are also not marked.

A nice touch, when speed is not important, is to put a short piece of coax to a miniature toggle switch in-line with diode D-50. This disables the mod to restore the smooth changeover from transmit to receive the 430 has normally. In CW, with D-50 clipped, the receiver kicks back to life with a sharp crack and gets annoying when the gain is really high, chasing after a weak DX station, for instance. So the switch removes diode HD-50 for AMTOR and returns it to the circuit for anything else. Beware! Everything is very tiny, very crowded, and very expensive.

from NCARC COMMUNICATOR

IC-2AT Mod from KA8CNI via KB8CI PBBS

I routinely use a half-wave antenna on my IC-2AT handheld. When collapsed, the antenna has the same gain (loss) as a rubber duck, while giving me greater range when fully extended. There is a certain amount of movement of the center pin of the BNC connector with the half-wave antenna on the handheld. This movement causes fatigue fracturing of the wire connecting the printed circuit board to the BNC connector. After numerous failures, I used the braid of RG-174 coax to make the connection.

First remove the BNC from the radio and break off the unused ground lug. The pin of the BNC should be placed into the end of the braid. Wrap a thin piece of wire around the braid 3–4 times, secure it, then solder it. Reinstall the BNC and dress the braid to the solder pad on the printed circuit board and solder. Do not heat the braid too long while soldering, as solder will be drawn up, making it stiff and subject to fatigue fracturing.

from NCARC COMMUNICATOR

All About Henry for the C-64

I read with interest the article by W.K. McKellips WB4DCV, "All About Henry," in the November 1988 issue of *73*. Knowing from experience how difficult it is to measure the value of coils, I immediately built the oscillator that he described, and with skepticism, anxiously awaited the results.

The program had been written for an Apple 2+ and it would not run on my Commodore 64, so I had to make a few changes. After this, I found to my surprise that it was possible to measure the small ones as well as the big ones without much trouble.

Since C1 (0.001) is important for accuracy, get it as close to 1000 pF as you can. If C1 is slightly under, you can add silver mica condensers in parallel to put it on the nose.

If the program doesn't work the first time, check to make sure you typed it in correctly. It's difficult to get all the periods, semicolons, etc., right the first time.

When you make a change in a line, be sure to press RETURN to put the change in memory. After pressing RETURN, press RUN/STOP and RESTORE at the same time, then hold the CTRL key down and press 2. You'll get a white cursor, which is more visible than the blue cursor. Type LIST to view the entire program on the screen.

If you'd like to check the program before you've built the oscillator, you can run the program by using the following procedure using the following figures. When entering 679 kHz as F1, the program will show an LS = 54.94μH. When F2 is set to 615 kHz, LX = 12.02 μH/0.01 mH. When F2 is 409 kHz, LX = 96.47 μH/0.09 mH. When F2 is set to 20 kHz, LX = 63,269.04μH/63.26 mH/0.063 H.

In the original program, line 80 has a small inverted "v." This is the up arrow to square F1. Other printers might show it in other ways. Also, CLR/HOME (in reverse field), used to clear the screen in line 5, could be shown as a heart by a Commodore MPS 801, and as a small "s" by a Blue Chip printer.

```
READY.

5 PRINT"■":REM-HOLD SHIFT AND PRESS CLR/HOME-THIS CLEARS THE SCREEN
10 REM-ALL ABOUT HENRY
15 REM-COMPLETE PROGRAM FOR LS AND UNKNOWN VALUE.(LX)-FOR COMMODORE 64
30 C=1000:REM-(C=.001)
40 PRINT"FREQUENCIES SHOULD BE IN KHZ."
50 INPUT"ENTER FREQ #1";F1:PRINT
60 IF F1=0 THEN END
70 F1=F1/1000:REM-CONVERT TO MHZ FOR FORMULA
80 LS=25330 / (1000*(F1^2))
90 LS=INT (LS*100)/100
100 PRINT: PRINT"INDUCTANCE STANDARD (LS)"LS "UHY"
110 REM 2ND PART FROM JULY '88 RADIO ELECTRONICS
120 LS=LS/1000000:F1=F1*1000
130 INPUT "ENTER FREQ #2";F2:PRINT
140 IF F2>F1 OR F2=0 THEN GOTO 10:END
142 PRINT
144 PRINT"   UNKNOWN VALUE (LX)
146 PRINT
150 LX=((F1/F2)^2-1)*LS
160 PRINT INT (LX*100000000)/100;"UHY"
170 PRINT INT (LX*100000)/100;"MHY"
180 IF LX <.01 THEN 200
190 PRINT INT (LX*1000)/1000;"HYS"
200 PRINT
210 GOTO 130

READY.
```

Figure 1. Program for LS and LX.

You must have the article, "All About Henry," to use this information. If you don't have this issue, you can request a copy directly from *73 Magazine* for a small fee.

You can also measure capacitors with a unit you can buy assembled or in kit form, as described in the July 1988 issue of *Radio Electronics*. Good luck.

Lindsey M. Riddle W5JG
New Orleans LA

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Conversions for Field Day

The end of June brings Field Day, a great time to operate QRP. You can show the rest of hamdom just what several watts can do! This month we'll look at some simple modifications for Field Day use.

The ICOM IC-735

First, a modification to convert the popular ICOM IC-735 to QRP operation. These modifications will let you operate the IC-735 at QRP power levels down to one watt or less. **DON'T ATTEMPT THIS IF YOU ARE NOT SURE OF WHAT YOU ARE DOING!** Leave it for someone who feels secure working inside a modern transceiver.

Start by removing the bottom cover. With the radio turned upside down, find the slide switch at the rear left center. This is the switch that selects either 50 or 100 watts as the maximum output available from the transmitter. Push the switch to the rear of the radio. This is the 50 watt position.

Next, find the pot labeled R-267 at the right rear of the radio. Turn the pot to full clockwise position. This is the minimum output setting. You should now have about four watts output with the front panel control set at minimum, and about 50 watts out at maximum. R-268, located just to the right of R-267, sets the maximum power output when the front panel control is advanced to the maximum position.

Find the pot labeled R-361 at the front left of the radio. If you want a lower power output, adjust this pot for the lower power setting desired. This adjustment is quite touchy at settings below two watts out but, if you are careful, you can get outputs down to approximately one watt. You can maintain this power level through a reasonable amount of vibration, such as while operating portable or mobile. Be aware that this adjustment will probably change the power output obtainable when the front panel control is advanced to the maximum position. For example, with R-361 adjusted to 1.9 watts, the maximum that you can get is 30 watts.

Replace the bottom cover. You should now have power control for the IC-735 while operating QRP.

The newer IC-725 can be adjusted down to QRP levels via the front-mounted drive control. You won't need to get inside this radio to modify it for QRP use.

The Ten-Tec Argosy

If you're really a glutton for punishment, how about running milliwatts for Field Day? If you have a Ten-Tec Argosy, milliwatting is easy to do.

Remove the top cover of the Argosy. Look for the RF mixer board located in the right center of the transceiver. (In my Argosy II, the mixer board is numbered 80784-d.) On the right side of the mixer board you'll see two pots. The one we're looking for is labeled R4. Locate the power adjust switch on the rear apron of the Argosy and move it to the QRP position. Adjust R4 to control the low power output of the radio. This can be set to less than five watts output. The ALC will hold this level. That's all there is to it.

Before you replace the cover, you might want to do another simple modification to the Argosy II. If you're like me, you'll have noticed the bleed over from the meter light onto the LED display. This is most noticeable when you turn the display off to save on battery power.

The fix is simple. Cut a small piece of fishpaper to fit between the meter and the LED display board. Fishpaper is thin, stiff, nonconducting cardboard. It is also flame-resistant. You can use just about anything in place of fishpaper as long as it meets these requirements. Fashion the fishpaper to an "L" shape and it will fit nicely between the meter and the display board. Now when you turn off the LEDs you won't see the circuit board illuminated by the meter lamp.

The Century 21

If you're running a Century 21 for Field Day, this modification may be of interest to you. Using the Century 21 at QRP power levels is difficult. You can adjust the Century 21 much easier if you change out the drive control. The original control pot is a 10k **LINEAR** taper. Replace this control with a 10k **AUDIO** taper pot. You can get these at your local Radio Shack store. This makes low power settings easier. Results will vary from radio to radio. The Radio Shack pot is not an exact mechanical replacement.

You'll have to tighten the hex nut against the inner panel with the spacer loose on the pot shaft. Lacking a hex nut on the front panel isn't a problem. Just put the knob on the shaft and have a ball.

The Heath HW-9

Most of the HW-9s I've seen drift positive about three or four kHz over several hours. One of my earlier columns had some mods for curing drift in the HW-9. Some of you wrote to me saying that the mods didn't work; others said that they worked like magic. Well, here's one mod for HW-9 VFO drift.

Since diode junction capacitance varies with ambient temperature levels, two 1N914s are connected back-to-back and soldered across variable capacitor C1 (points E and GND). This procedure will shift dial calibration which can be reset by adjusting the VFO coil, L118. You might want to try different pairs of diodes to find the characteristics to best suit your needs.

Solar Power

To get a few more extra points, many QRP stations are operating with solar power. Using just the solar panel for power, without a battery for energy storage, can be a real challenge. I've always used a battery along with a solar panel for Field Day. The battery serves as the voltage regulator and it will operate the radio at night.

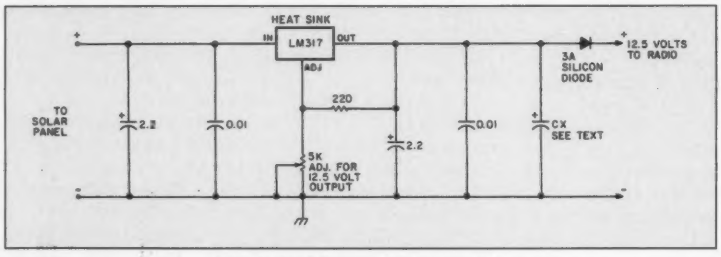
If this is your first time operating with solar power, remember: **NEVER CONNECT A SOLAR PANEL DIRECTLY TO A RADIO WITHOUT EITHER A VOLTAGE REGULATOR OR A BATTERY TO SERVE AS A REGULATOR.** The open circuit voltage of most photovoltaic panels approaches 20 volts. This will fry your new radio instantly.

Figure 1 shows a simple circuit for a small voltage regulator. This will hold the voltage down to a safe level for direct use by the radio. When the sun shines, the radio will operate. With the voltage regulator listed you can run about an amp of current to the load. The LM317 will go to 2 amps if heatsinked to a larger piece of metal. I used a small heatsink and have no trouble at one amp. Don't allow the regulator to sit in the sun—you don't want to add to the heat build-up. And, of course, you must have the solar panel at the required power to run the load directly without a battery. You'll need at least a five watt panel under full sun to operate the Argonaut.

Notice the use of large capacitors at Cx. These are computer-grade units from hamfest flea markets. The capacitors will smooth out the rough spots when the sun hides behind a cloud or two for a short time. A 90,000 µF cap works quite well at both locations. The more the merrier! Allow the panel to charge up the capacitors before you connect the load. Watch the operating voltage of the capacitors at Cx. You'll need at least 30 VDC working for the panel side of the regulator, less on the load side.

Build the circuit on a piece of perfboard. You can get all the parts from the local Radio Shack store. Test the regulator by substituting a power supply for the solar panel. Adjust the supply for 20 volts. Adjust the trimmer on the regulator for 12.6 volts. That's all there is to it! Tidy things up so you won't short out the regulator and you're off.

This year at Field Day, when you turn it on, turn it down. Please send me photos of your setup.



A simple circuit for a small voltage regulator.

Amateur Software for the Commodore User

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ART-1: A complete interface system for send and receive on CW, RTTY (Baudot & ASCII) and AMTOR, for use with the Commodore 64/128 computer. Operating program on disk included. **$199.00**

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SPECIAL EVENTS

Ham Doings Around the World

Listings are free of charge as space permits. Please send us your Special Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the August issue, we should receive it by May 31. Provide a clear, concise summary of the essential details about your Special Event.

JUNE 1–2

ALBANY GA The ARRL Georgia State Convention and Southeast Packet Conference, sponsored by the Albany ARC, will be held at the Heritage House Motel & Convention Center 5 PM–9 PM Friday, 8 AM–4 PM Saturday. All rooms $39. Reservations: *800–476–5193.* Admission $3. Tables $8 for both days. Free parking. Talk-In: 146.82, 444.5. Contact *Albany ARC, PO Box 1205, Albany GA 31702. 912–883–7910 (M–F, 9–5).*

JUNE 2

PITTSBURG KS The Pittsburg Repeater Organization, Inc. will hold its Annual Hamfest in Lincoln Center from 8 AM–3 PM. VE exams. Admission $5 includes chicken dinner. Talk-in: 146.34/.94. Contact *Kenneth L. Johnston, 2402 Wall, Joplin MO 64804. 417–623–1895.*

ATHENS GA The Athens Radio Club will hold its Annual Hamfest from 8 AM–4 PM at Sandy Creek Park. VE exams at 9 AM. Walk-ins welcome (bring license copy). Adult admission $2, children 50¢ (includes park entrance fee). Some tables available for flea market space. Talk-in: 146.745/145 and 147.225/.825. Contact *Joe Londeree KC4EJY, 404–353–8196.*

KITCHENER ONTARIO CANADA The Central Ontario Amateur Radio Fleamarket, jointly sponsored by Guelph ARC and Kitchener-Waterloo ARC, will be held at Bingeman Park 8 AM–2 PM. Opens 6 AM for vendors only. Admission $5. Vendor tables $8 per 8' space. Children 12 and under free. Talk-in: KSR 146.37/.97; ZMG 144.61/145.21; simplex 52/52. For advance tickets and table confirmations contact *Fleamarket Chairman, Ray Jennings VE3CZE, 61 Ottawa Cresc., Guelph Ont. N1E 2A8. 519–822–8342.* Make checks payable to: Central Ontario Amateur Radio Fleamarket.

KNOXVILLE TN The 24th Annual Knoxville Hamfest and Computer Fair, sponsored by the RAC of Knoxville, will be held from 8 AM–5 PM at the Convention Center at the World's Fair Park. Admission is $5. Dealer and fleamarket tables $11, includes 2 chairs. Crafts and home products also featured. VE exams. Garage parking and trailer compound available. Talk-in: W4BBB 147.30+, 145.37–, and 224.500. For table reservations contact *Frank Ambrister N4OQJ, PO Box 9605, Knoxville TN 37940. 615–933–2539.* For license exam reservations contact *Ray Adams N4BAQ, 4325 Felty Drive, Knoxville TN 37918. 615–687–5410.*

JUNE 2–3

WENATCHEE WA A Hamfest will be held at Rocky Reach Dam by the Apple City ARC. Registration fee for amateurs is $5, others $1, children under 12 free. The banquet at 6:30 PM Saturday (at the Masonic Temple) is $7 per person. Free camp and trailer space with power will be at the west side of the dam after 2 PM Friday, under Wagonmaster control. VE exams 2 PM Saturday at the Powerhouse. Talk-in: 2 meter FM 146.30/.90, 147.38/.98; 146.49 simplex. Mail registration to *Bob Lathrop, Treasurer, 919 N. Woodward Drive, Wenatchee WA 98801.* Make checks payable to Apple City Radio Club.

JUNE 3

NEWINGTON CT The Newington ARL will hold its 7th Annual Amateur Radio and Computer Flea Market from 9 AM–2 PM at the Newington High School. Indoor tables. Tailgating. Admission $3 at the door. Contact *NARL Flea Market, PO Box 165, Pleasant Valley CT 06063* (SASE, please). *203–523–0453.* For VE Exam info: *Tom Namnoum KM1O, 203–666–1615.*

QUEENS NY The Hall of Science ARC Hamfest will be held at the New York Hall of Science parking lot—Flushing Meadow Park. Doors open at 9 AM. Set up after 7:30 AM. VE exams at 10 AM. Donation, buyers $3, sellers $5 per space. Talk-in: 144.300 simplex, 223.600 repeater and 445.225 repeater. For information call at night, *Steve Greenbaum WB2KDG, 718–898–5599 or Phil Kubert N2HYE 212–777–8648.*

PRINCETON IL The Starved Rock Radio Club Hamfest will be held at the Bureau County Fairgrounds beginning at 6 AM. Advance tickets are $3.50 before May 20th and $4 at the gate. Free camping and outdoor flea market area. 8' tables indoors are $10. Talk-in: 146.355/.955 or 147.72/.12. Contact *Pete Jacobsen AA9R, 19 Briarcliff Drive, Spring Valley IL 61362-1001. 815–664–5580.*

BUTLER PA The 36th Annual "Breeze Shooters" Hamfest will be held at the Butler County Farm Show Grounds from 8 AM–4 PM. Admission is $1 at the gate. Indoor tables $10. Free tailgating. Designated handicap parking. Talk-in: 147.96/.36. Check in on 146.52. Contact *H. Rey Whanger, RD 2 Box 8, Cheswick PA 15024. 412–828–9383.*

CHELSEA MI The Chelsea ARC, Inc. will hold their 13th Annual Chelsea Swap N' Shop from 6 AM–2 PM at the Chelsea Fairgrounds. Donation: $2.50 in advance, $3 at the gate. YLs, XYLs and kids under 12 free. Table $8 per 8' space. Trunk Sale: $2 per space. Special handicap parking. Send SASE to *Robert Schantz, 416 Wilkinson Street, Chelsea MI 48118. 313–475–1795.*

MANASSAS VA The Ole Virgina Hams ARC, Inc. will sponsor the Manassas Hamfest and Computer Show at the William County Fairgrounds. Open to public 8 AM, tailgaters 7 AM. General admission is $5, tailgating $5 additional per space. All activities wheelchair accessible. Talk-in on the Manassas repeater, 146.37/.97 and 223.06/224.66. Unlimited tailgating space. For further information: Dealers contact *Joe K4FPT, 703–368–8599.* For general information contact *Rosemary KI4VO, 703–361–5255.*

LANCASTER NY The Lancaster ARC will hold their 2nd Annual Hamfest at the Depew Grove from 8 AM–4 PM. Advance tickets $3. Indoor space $4 per 8' table. Reserve early. Contact *Al Lincoln KB2FIN, 2779 Stony Point, Grand Island NY 14072.*

JUNE 9

GRAND RAPIDS MI The Independent Repeater Assoc. is sponsoring its Annual Hamfestival at the 44th St. Armory from 8 AM–4 PM. Walk-in VEC exams 9 AM. Tables for dealers, sellers $4 each. Reservations with SASE only. Contact *Bruce N8IRW, 616–453–8029* or write *IRA, c/o Bruce Rittenhouse, 562 92nd St. S.E., Byron Center MI 49315.*

MIDLAND MI The Central Michigan ARA will sponsor their 16th Annual Hamfest at the Midland Community Center from 8 AM–1 PM. Admission is $3. Tables $8. Talk-in: 147.000 + 0.600 MHz. Contact *CMARA Hamfest, PO Box 67, Midland MI 48640. 517–631–9228 evenings and weekends.* Please SASE.

WINSTON-SALEM NC The Forsyth ARC presents its 3rd Annual Hamfest, Computer & Electronics Fair at the Benton Convention in downtown Winston-Salem. Fleamarket set-up 6 AM–9 AM. Doors open at 9 AM–3 PM. Advance tickets $4, $5 at the door. Tables $10/8'. Talk-in: 146.64/.04. Send SASE to contact *Jim Rodgers N1DRI, W-S Hamfest, PO Box 11361, Winston-Salem NC 27116. 919–760–2493, 9 AM–10 PM.*

JUNE 9–10

CHEYENNE WY The SHY-WY ARC will host the Wyoming Hamfest at the Holiday Inn. VE exams. Talk-in on 146.175/.775 or 146.22/.82. Contact *Fred Dumire N7JPR, PO Box 6262, Cheyenne WY 82003.*

GRANITE CITY IL The Egyptian RC will conduct the Annual Egyptianfest at their clubgrounds on Chouteau Place Rd. from 6 AM–3 PM. VE exams. Saturday nite camping is available. Advance tickets $1 each/6 for $5 or $2 each/3 for $5 at the Egyptianfest. Talk-in: 146.16/.76, 146.19/.79 and 442.400 on the ERC-W9AIU repeaters. Contact *Carl Waller WB9YDK, PO Box 562, Granite City IL 62040. 618–345–6469.*

JUNE 10

WINFIELD PA The Milton and Central Susquehanna Amateur Computer and Ham Radio Clubs will host the 17th Annual Central PA Ham and Computer Fest at the Winfield Fireman's Fairgrounds from 08:00–17:00 EST. VE exams by advanced registration. Donations $4 at gate, XYLs, YLs and children free. Tailgating $1 for 6' table. Talk-in: 146.97, 147.18 and 146.52. Call or write *Jerry Williamson WA3SXO, 10 Old Farm Lane, Milton PA 17847. 717–742–3027; or Bob Stahl KQ3KR, 452 Fourth St., Northumberland PA 17857. 717–473–7050.*

LAWSON MO Children between the ages of 8 and 14 who are accompanied by an adult relative may participate in a 43-hour field event starting at 5 PM at the Watkins Mill State Park. No fees except state park entrance fee. The Marlborough Elementary School Communications Club has organized activities in which child-parent/grandparent teams may participate. Accompanying adults who are hams may bring their own radio equipment. Limited camping spaces with electricity. Participants are responsible for their own tents, gear and food. Elementary and middle school radio clubs are invited to participate as units when accompanied by club sponsors or teachers. Contact *Chuck Bryan, Marlborough Communication Club, 1300 E. 75th St., Kansas City MO 64131. 816–926–2134. Packet address: KBØCUS @ WBØAEX.*

AKRON OH The Goodyear ARC's 23rd Annual Hamfest and Family Picnic will be held at Wingfoot Lake Park (near Akron) from 8 AM–4 PM. Admission to outside flea market is $3 per vehicle. Inside dealer area available at $6 per table (advance reservations suggested). No overnight parking, no pets, no swimming please. For tickets and info contact *William F. Dunn W8IFM, 4730 Nottingham Lane, Stow OH 44224. 216–673–8502.*

WILLOW SPRINGS IL The Six Meter Club of Chicago, Inc., is pleased to announce its 33nd Annual Hamfest. This event is to be held at Santa Fe Park beginning at 6 AM. Advance registration $3, $4 at the gate. Pavillion space is limited. A donation of $20 per table space is requested. Overnight camping not permitted by Santa Fe Park managment. Talk-in K9ONA 146.52 or K9ONA/R 37–97. Get advance reservations from *Mike Corbett K9ENZ, 606 South Fenton Ave., Romeoville IL 60441.*

JUNE 11

BOULDER CO The Boulder VE Team will be testing at 7 PM at the American Legion. Pre-registration is preferred but walk-ins are welcome. Please bring driver's license, one other ID, check or MO payable to ARRL-VEC for $4.95. If you currently have a license, bring it and a copy. If you claim credit for any test elements, bring originals of certificates of completion of an exam and a copy of the FCC 610 you submitted. Also bring soft pencils and a calculator. For info and to pre-register call *Barbara McClune N0BWS, 303–530–1872.*

JUNE 15

VERONA NY The Madison-Oneida ARC is holding VE exams at the Madison-Oneida BOCES starting at 7 PM. Talk-in on 145.37. Contact *Leonard Popyack WF2V, 315–853–8974, or on 146.79, 145.37, WF2V @ WA2TVE, or POPYACK @ TOPS20.RADC.AF.MIL.*

JUNE 17

CROWN POINT IN The Lake County ARC will sponsor its Annual Fathers' Day Hamfest in the Industrial Building of the Lake County Fairgrounds from 8 AM–2 PM. Free parking. Set-up at 6 AM. Free parking. General admission $3.50. Tables $5. VE exams with Novices free and walk-ins welcome. Talk-in on the LCARC repeater 147.00 or 146.52 simplex. Contact *Ken Brown KE9TC, 918 Chippewa, Crown Point IN 46307, or call 219–663–5035.*

FREDERICK MD The Frederick ARC will hold its Annual Hamfest at the Frederick County Fairgrounds from 8 AM–4 PM. Admission $4, tailgaters $5 for each 10' space. Wives & children free with one paid admission. Indoor tables $10. Write to *Ernie Hansen K3VVV, PO Box 589, Mt. Airy MD 21771.*

SANTA MARIA CA The Satellite ARC will hold its Annual Santa Maria Radio Swapfest and Barbecue at the Union Oil Company Newlove Picnic Grounds from 9 AM–4 PM. Tables are available at 7 AM for $3.50. Top Sirloin Barbecue at 1 PM, $7.50 for adults and $3.50 for children. VE exams, free parking. Talk-in: 146.94. Contact *Esther Miller, PO Box 5117, Vanderberg AFB CA 93437* or call *805–937–8878.*

MONROE MI The Monroe County Radio Communications Assoc. will sponsor its 1990 Hamfest at the Monroe County Fairgrounds. $3 advance, $4 at the gate. Handicap parking inside the grounds. Exhibits are wheelchair accessible. Talk-in 146.12/.72 and 223.18/224.78. Contact *Fred Lux WD8ITZ, PO Box 982, Monroe MI 48161. 313–243–1053.*

STEVENS POINT MI The Central Wisconsin RA, Ltd. is holding its Annual Swapfest at the University Center on the University of Wisconsin-Stevens Point campus. Free parking. Handicap accessible. Tables and electricity available for commercial venders. Groups and clubs dedicated to amateur radio are invited to request space for meetings. Facilities assigned on a first-come, first-served basis. Please contact *Art Wysocki N9BCA, CWRA Swapfest Chairman, 3356 April Lane, Stevens Point WI 54481. 715–344–2984.*

JUNE 23–24

LEMPSTER NH The Connecticut Valley FM Assoc. will hold a Flea Market at the Dodge Hollow Campground from 9 AM–4 PM. Camping space available. Field Day operations. Talk-in: 146.160/.760 and 146.490. For info contact *Conrad Ekstrom WB1GXM, PO Box 1076, Claremont NH 03743-1076. 603–543–1389.*

SPECIAL EVENT STATIONS

JUNE 1–3

ST. LOUIS MO The Amateur Radio Operators of the St. Louis Area Council, Boy Scouts of America will operate Station K2BSA/Ø from Friday 2200Z–1700Z Sunday, to commemorate Rendezvous 90, a Scout Jamboree where over 25,000 scouts will be in attendance. Frequencies: Phone 3.940, 7.290, 14.290, 21.360, 28.350; CW 3.590, 7.125, 14.070, 21.140, 28.190. For QSL send your QSL and SASE to *Richard A. Grady, 5976 Keith Place, St. Louis MO 63109.*

JUNE 2

PROVIDENCE RI The Rhode Island A.R.E.S./Red Cross Network will operate Station K1JFI from the Narragansett Bay Chapter A.R.C. State Communications Center from 1200Z–2400Z. This will be part of the First Annual RI Emergency Communications test. Frequencies: General Class 40 & 15 meter phone bands; Novice 10 meter phone band. For certificate send QSL & QSO number with an SASE (or IRC's) to *The Roger Williams VHF Society K1JFI, PO Box 40001, Providence RI 02940-0001.*

JUNE 2–3

MADISON OH The Wireless Institute of Northern Ohio (W.I.N.O.), an organization sponsored by the Lake County ARA, will operate Station KO8O Saturday from 2300Z–0300Z on 7235 and 14235 kHz, and Sunday from 1500Z–1900Z on 14235 and 21310 kHz. The station will be located at a winery. A special 8½ by 11 QSL certificate will be available from *KO8O—WINO Weekend, 10418 Briar Hill, Kirtland OH 44094* for a legal sized SASE.

JUNE 3

NORTH OLMSTED OH West Park Radiops will operate Station W8VM beginning Saturday 0000Z–1500Z Sunday. Frequencies: 80–10m, lower portion of General phone and Novice phone on 10m; all Novice CW on 80–40–15m. Send QSL and SASE to *W8VM, c/o Glenn Williams, 513 Kenilworth Rd., Bay Village OH 44140.*

JUNE 15–17

TEXAS 1990 Smirk Party Contest #15 from Saturday 0001–2400 Sunday, Texas time. To be eligible for contest awards pay your 1989 dues. Failure to provide your name, call, and smirk # on your log will disqualify. For details contact *Lisa Lowell KAØNNO, PO Box 307, Hatfield AR 71945.*

JUNE 16–17

ISLETON CA The Isleton ARS will operate Station N6OGJ from Saturday 0000Z–2400Z Sunday to celebrate the Annual Crawdad Festival. Operation will be SSB, CW, PKT and RTTY in all lower portions of the General and Novice bands. For a certificate send a QSL and SASE to the *Isleton ARS, PO Box 801, Isleton CA 95641.* Contact *Debra Taylor N6MQQ, 415–732–8319, or Richard Teitzel N6OGJ, 916–777–6448.*

Never Say Die

Continued from page 4

rulemaking proposal was announced. This makes it impossible for a NIAC group to talk with the commissioners until this rulemaking is terminated . . . and that's going to be maybe a year from now . . . at best. It could drag out for five years, like "Incentive Licensing" did.

That's a pity because amateur radio is far more important to our country than I suspect the commissioners understand. I think it would be extremely helpful if half a dozen representative ham industry members could talk with the commissioners and explain what has happened in the past, what's happening now, and what all this means to the future of America. It wouldn't take very long . . . we could do it in one day . . . and we do have one heck of a story to tell.

We used to have an effective amateur radio National Industry Advisory Committee (NIAC), but the commissioners got so angry when their last no-code rulemaking proposal was trashed by the ARRL that the NIAC was killed in retribution. I made sure the FCC was again open to such an organization before I proposed it. I got an enthusiastic response from the Commission, but then was stiffed by the ham industry. That surprised and disappointed me, since the health of our hobby directly affects everyone's sales. It seemed to me to be a tad shortsighted. I got the feeling that I was one of the few in the business who really cared whether ham radio lived or died.

You see, I believe that the health of amateur radio has a direct bearing on America's technological future. As our country heads into the 2000s, where technology will be the determining factor separating the countries which are strong from those which are weak, I'm afraid we're going to be crippled without amateur radio providing the needed engineers, technicians and scientists.

My recent proposal that entrepreneurial hams consider desktop publishing brought in a huge stack of mail. Much of it said in effect, well you warned us when repeaters came along that there were business opportunities . . . and now look at cellular radio! Then you told us to get into computers . . . and you were right! Next you said to look out for compact discs . . . and that turned into the fastest growing consumer electronics industry in history. My record of calling the future isn't bad.

But apparently it wasn't nearly good enough to convince the ham industry. 95% of 'em thought I was full of baloney. There goes that gloom and doom Wayne Green again.

I predicted that Novice Enhancement wouldn't change anything. Hoo, was I right. I said the Archie comics were a huge waste of money. I said the ARRL videos promoting amateur radio were a waste of money. I really hate being right.

This spring would have been the ideal time for a NIAC group to meet the newly reformed Commission. The new commissioners are just getting settled into trying to cope with the demands for more frequencies and technology decisions which have far reaching implications.

They're trying to cope with the HDTV issue. The Information Age has brought with it the need to communicate all this information, and that means sorting out the roles for cable, fiber optics, microwaves, satellites and so on. Cellular radio has opened the door; now we're going to be faced with the spectrum needs for a pocket personal portable telephone system.

The job of a commissioner has never been great. Now, with communications demands multiplying a thousandfold, it's a killer. The public doesn't see any reason why they shouldn't all have direct satellite high definition TV on a hundred channels. They want a telephone, probably with fax, in their pocket, car and boat. They want an emergency location system for hikers. UPS and other fast delivery services want instant communications between their trucks and their computers, preferably with graphics capability. And all this has, somehow, to be crammed into the radio spectrum.

Did I mention community TV stations? The pressure is on for more AM and FM radio channels . . . probably to broadcast more Top-40 porno-rock garbage for teenie boppers.

The Long Range

A few years ago the FCC set up a Long Range Planning Committee (LRPC). Yes, I was a member. The purpose of the committee was to lay down some long range plans for coping with future emergency communications situations.

The committee discussed plans for coping with small local emergencies right on up to a full-scale nuclear attack. The committee was made up of top people in the government and communications industries. It was an impressive group.

The committee came to the conclusion that of all the communications services, only amateur radio would be able to cope with any serious emergencies. They found that the telephone service was the first to go. This was disturbing because so much of the present emergency contingent services have been designed to use the telephone. Most civil defense groups have gotten rid of their amateur radio helpers and are using the phone. Most emergency radio station coordination is by phone. What to do?

Then, as the committee looked into the ability of amateur radio to provide the communications which would be needed in any serious emergency, it was painfully obvious that a handful of old hams using Morse code (or even voice) would be completely useless. Only high speed digital systems could even hope to cope with the projected traffic volumes.

The slowness of packet radio acceptance and the refusal of most oldtimers to even consider this high speed system meant that either something be done to attract youngsters to the service or it would be almost useless. This came down to the major stumbling block to getting newcomers licensed: the code.

This was why the FCC tried to get a no-code class license through. Then, when the ARRL got their member clubs to kill the proposal, the FCC Commissioners and staff were frustrated and angry. They disbanded the LRPC and amateur radio NIAC. Relations between the FCC and amateur radio, though seldom friendly, had never been worse.

With Bush's appointees replacing most of the old Reagan Commission, we finally had an opportunity to mend fences. We do have a lot of residual poison to overcome from the FCC staffers. These are the career FCC people who do the work and make the recommendations to the commissioners. These are the legal, technical and political people who, alas, have long memories for insults and slights from ARRL presidents and legal representatives.

The FCC "ex parte" rules make it illegal for anyone to sit down with the the commissioners and discuss anything to do with amateur radio. Obviously, any ham matters discussed would necessarily touch in some way on the current no-code rulemaking situation. The ex parte rule was set up to limit the influence of lobbyists on the FCC Commissioners and staff. Once something has been released for rulemaking it can no longer be discussed . . . unless the discussion is reduced to writing, and filed.

In this respect, the ARRL no-code petition, which triggered the rulemaking, could hardly have been submitted at a worse time.

With new commissioners coming on line, there was no practical way for them to deal with the ARRL petition except to just let their staffs go ahead and do it. Ultra bad timing for us.

Our 100,000 Techs

The recent FCC no-code rulemaking proposal threw an embarrassing light on the number of semi-hams we've allowed to stagnate: our Tech Class. The Tech ticket was supposed to be a halfway station toward General, not a backwater end in itself.

Thus a large licensee percentage is stuck up on our VHF bands, talking across town. Perhaps it's time to get 'em down onto our HF bands where they can enjoy DX pileups, jammed nets, DX lists, QRM, lengthy phone patches, band-jamming contests, plus an endless supply of brainless QSOs.

Dozens of ham clubs claim to have set up Novice classes, but if the graduating class pictures they've sent me so far are an indication, little has really happened yet. But now it's time to put this same boundless enthusiasm to work motivating Techs to get their General tickets. Hark, what is that sound I hear? Is it the groans from thousands of readers, oh lordy, Wayne wants us to DO something again!

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The only difference between a Tech and a General ticket is the code. 13 per. So isn't it almost time to get some 13-per code practice going in your club? If you use the system I outlined a few months ago you should have 'em over the hump in a few days. No, practicing for a few minutes once a month isn't going to do diddley (or dottilly). You need to get 'em off dead center and practicing every night for maybe a crummy week.

Get 'em to get a practice tape and agree to stick at it every night for maybe 20 minutes. Please don't sabotage them with that miserable old ARRL code learning system which has already driven away hundreds of thousands . . . perhaps millions of potential hams in exhausted frustration.

You might cheer them on with stories of the wonders of working DX on the low bands. Tell 'em about the thrills of HF packet. It will be counterproductive to go into much detail about how pathetically little DX you can actually work in the 20m General band. Once they get there and find out, you can explain how simple the Advanced Class test really is.

So let's clean up our act. Let's give all those 2m repeater addicts a taste of real hamming. Tell 'em how eagerly the old timers on 3999 are waiting for them to check in. Ten is wide open to the whole world these days . . . calling them. All you have to do is overcome about twenty years of encrusted inertia.

Constitution Prohibits Morse Code

Yes, I know, virtually all our courts except the Supreme Court are infamous for ignoring our constitutional rights, so bringing up a constitutional argument against the code is a complete waste of time. But the Constitution is quite clear in this matter.

The First Amendment says, "Congress shall make no law respecting an establishment of religion . . ." Well, Congress, through its sneaky agent, the FCC, has done just that and the religion they've established by law is the Morse Code. Morse Code is a belief system, with no more factual proof of its validity than any of the hundreds of other religions around the world.

As I have always said, I respect those hams who are true Morse believers . . . who believe that the Code is good for the soul and will keep out the heathen. I respect the high priests and the skills they have developed. I respect the enjoyment their religion brings them . . . the ecstasy. I'm just upset that this religion is a matter of United States law and a child of Congress, despite the First Amendment, which specifically prohibits such a congressional construction.

If I were mischief-oriented I would also point out that even the FCC regulations are clear in prohibiting our communicating in other than plain language. The Code is anything but plain language. Can we use plain Urdu language legally? It takes a lot of time and work to learn to communicate via the Morse Code, so it's anything but plain language here in America. There are more people in America who speak Chinese than know the Code. More who know Polish, Czech, Yiddish, and many other languages. Morse is an extreme minority language, yet it is mandated by Congress that we learn this rare dialect in order to be permitted to communicate with each other . . . even if we're not going to use it!

When are we going to march angrily on Washington and fight for our beloved constitutional rights? Or are you going to sit there and wimp out, wringing your hands in embarrassment, hoping someone else will do what needs to be done? Where's your spunk?

What To Do? What To Do?

If you believe that amateur radio will best be served by stopping all further Novice or Technician licenses from being issued and changing instead to a Communicator License with a Tech level exam and no code test . . . and with privileges only above 220 MHz, then write to the FCC, Washington DC 20554, commenting positively on RM9055.

If you believe, as thousands of hams do, that the code is so odious that only a federal law forcing people to use it will keep it alive, back up your convictions with a letter to the FCC. If you believe that preserving the code is far more important than preserving amateur radio, let the FCC know.

If on the other hand, heaven forbid, you aren't in complete agreement with the ARRL on this rulemaking, you'd better darned well write. On the other hand, isn't it better not to get involved and let someone else worry about all this?

No, I don't believe that anyone at the League was "bought off" on this one as a way to put a finishing blow on the hobby and thus free up hundreds of billions of dollars of microwave frequencies for commercial use. Yes, I know that there were some strong rumors that this has happened in the past. I read the Doyle (an incredibly indiscreet ARRL director) letters, too. But this "sale" of our ham frequencies was never actually proved.

You have until August 6th to speak (well, write) up.

There's one other thing you can do that would help. Since the ARRL is the only national organization we've got (they killed off the upstarts), all your money is riding on them. If you want the League to get busy selling amateur radio and would like to help stop them from sabotaging our hobby with nonsense like this Communicator Class license and their recent data communications petition, which I haven't even started to comment on as yet, you are going to have to become involved.

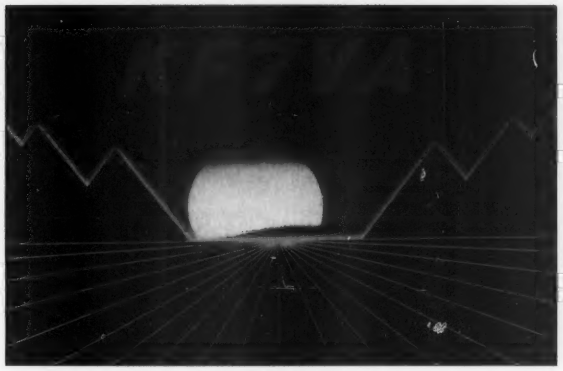
As long as you continue to blindly elect unqualified directors, you're going to get what you deserve. Elections come up every other year, so you could flush out the chaps who are killing our hobby in two years.

All most hams know about the League is what they read in *QST* . . . and not one in a hundred has even bothered to read the highly sanitized board meeting minutes. The League has its own Iran-Contra type scandals, you just don't know about them. Most hams don't *want* to know.

I've lifted one corner of the rock in the past, but the faithful start screaming that Wayne is bashing the League. Golly, isn't that what we heard when the Watergate scandal broke? Many Republicans didn't want to know. Anyone who complained was accused of administration bashing.

I'll tell you this . . . the editors of the ham magazines know, but seem terrified to say anything. Bill Orr, Stu Cowan and Pete Hoover know. They're the ones who recently demanded that ARRL President Price not be re-elected. But unless you know a director personally and he levels with you, *you* don't know. And, sadly, the odds are enormous that you don't want to be bothered.

I've had a great time with amateur radio during the last 50 years and I'll really hate seeing it go down the toilet. I try to get you to share in the good times I've had . . . and to help cure the bad aspects. 73



QSL OF THE MONTH

To enter your QSL, mail it in an envelope to *73*, WGE Center, Forest Road, Hancock, NH 03449. Attn: QSL of the Month. Winners receive a one-year subscription (or extension) to *73*. Entries not in envelopes cannot be accepted.

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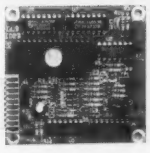

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TV Cameras

Finding an inexpensive video camera can be a real challenge these days. It seems that all that you can find at the local video store is a wide array of camcorders. Separate cameras have become a thing of the past. However, there are several sources to consider.

Look around at your local hamfest for any type of security cameras or the older stand-alone types. These can occasionally be obtained for a real bargain price, although you may find some burn spots in the image from the older security cameras.

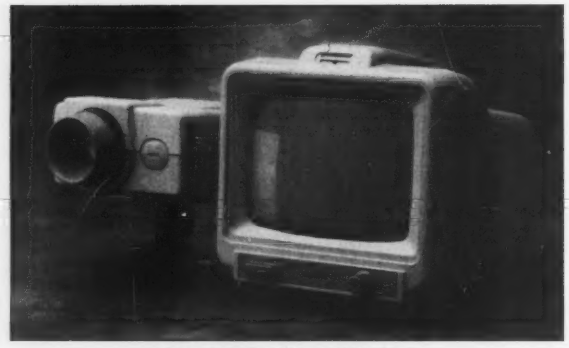

Photo A. Uniden "House Detective."

Fortunately, there are still a few commercial sources of stand-alone video cameras. One inexpensive choice is the Uniden security camera. This is a low resolution B/W camera requiring outdoor lighting. However, it is a CCD camera with an electronic auto-iris, and a good candidate for R/C aircraft, tower-mounted cameras and site security due to its small size and current drain. The Uniden camera is available from P.C. Electronics as well as DAK Corp under the name of "House Detective."

The Fordham catalog has a couple of pages of suitable cameras for ATV use. Although more expensive than the Uniden, these provide an excellent quality image at a fairly reasonable cost. One particularly good choice is the Sony HVM-322-BNC, a very lightweight, 6-ounce B/W camera which includes a motor-driven auto-iris. This camera has been used quite successfully in many balloon flights up to over 100,000 feet, and it has survived high speed impacts, −60 degree temperatures and occasional pointing at the sun. It's an excellent choice for R/C modelers and it can take a lot of high-G punishment. It comes with a built-in wide-angle lens and works quite well in light levels as low as 5 lux. Also carried in the Fordham catalog is the Sony model CCD-G1S color CCD camera which looks like a real winner, but be prepared to pay for the color!

CCTV Corporation is another good source for closed circuit cameras. The GBC model CCD-500 is a compact B/W camera with a C-mount lens (optional). The C-mount allows you to use a variety of lenses, including one with an auto-iris. The CCD-500 is perfect for astonomers due to its rated 0.02 lux sensitivity and excellent resolution. For this camera, the light from one match is enough to illuminate a room. Hooking a CCD-500 up to a 10-inch telescope allows you to distinguish stars down to about 9.5 magnitude.

The GBC model CCD-100 is one of CCTV's latest offerings. This ultra-compact B/W camera is a little smaller than a pack of cigarettes. They even offer fake cigarette packs in which you can conceal your camera, as well as a number of other "covert enclosures." The CCD-100 comes with a built-in 4mm lens which provides an ultra-wide 78-degree field of view. It weighs 3.5 ounces, and is usable down to 2 lux illumination. One of the unique features of this camera is its electronic shutter. The camera automatically adjusts to a wide range of lighting conditions by varying the electronic shutter from 1/60 to 1/15000 of a second. Due to its small size and low current drain, this ought to be another excellent candidate for R/C airplanes and mobile operations. It can serve as one of the building blocks for an extremely portable ATV station. Combine this with one of the small LCD TV sets and an ATV transmitter, and you have the makings of a "Handie-Lookie"!

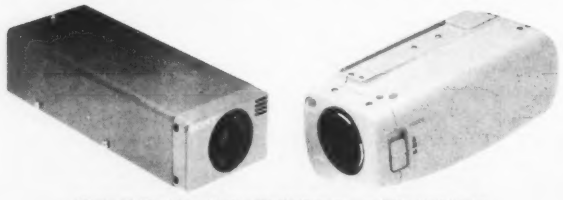

Photo B. The Sony HVM-322-BNC (left) and CCD-G1S (right).

Both of these cameras are available at dealer cost to *73* readers if you mention this column to Gary Perlin at CCTV. The CCD-500 is available for $469.50 and the CCD-100 for $325.

Compact color cameras are usually fairly pricey. One of the better deals is the Sanyo VDC-3900. This camera weighs 14 ounces, and is in the $600 price range.

The CANON CI-10 and CI-20 are self-contained miniature marvels. These high resolution color cameras are often used for network racing and sporting events. They have been attached to skiers, race car drivers and skydivers! The CI-10 measures just 2-1/2"W x 1-7/16"D x 4"H. The CI-20 is a compact 2-3/16"W x 2-5/16"D x 3-9/16"H. Both have a C-mount to allow for different lens configurations.

Photo C. GBC CCD-100.

Expect to pay for this miniaturization, as the CI-10 is priced at $1000 and the CI-20 at $1995.

Two other cameras in the CI-20 line may be of interest. The CI-20M is a high resolution B/W camera, and the CI-20R with its attached infrared light source will allow you to literally "see in the dark."

Philips Components has some inter-

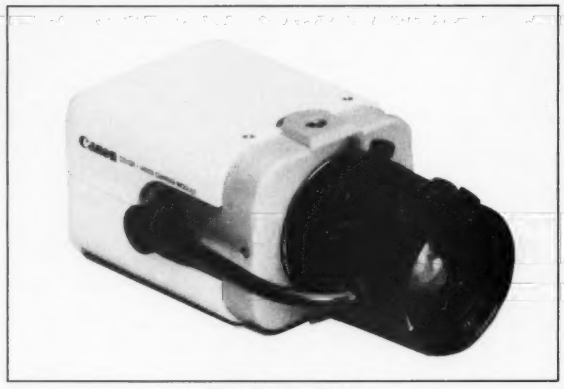

Photo D. Canon Ci-20.

TV Camera Sources

CCTV Corp. (GBC)
315 Hudson St.
New York, NY 10013
Ph: 1-800-221-2240

CANON U.S.A., Inc.
One Canon Place
Lake Success NY 11042
Ph: 1-516-488-6700

DAK Industries, INC.
8200 Remmet Ave.
Canoga Park CA 91304
Ph: 1-800-325-0800

EEV, Inc.
4 Westchester Plaza
Elmsford NY 10523
Ph: 1-800-342-5338

FORDHAM RADIO
260 Motor Parkway
Hauppauge NY 11788-5134
Ph: 1-800-645-9518
1-800-832-1446 NY

P.C. Electronics
2522 Paxson Ln.
Arcadia CA 91007-8537
Ph: 1-818-447-4565

Philips Components
P.O. Box 278
100 Providence Pike
Slatersville RI 02876
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Ph: 1-201-368-5018

Photo E. Rose Parade (photo courtesy of ATVQ).

know so I can pass along the information via this column!

Parades

A parade or special event is a golden opportunity to demonstrate the public service aspects of ATV. Parades, walkathons, bicycle tours, etc. all require some form of coordination and emergency services. If enough portable or mobile ATV stations can be put together in your area, you can offer your services to help out with any special event.

The annual Pasadena Rose Parade is one prime example of the effectiveness of ATV in public service. During the 1989 Rose Parade, the ATN group

Photo G. Ernie WB6BAP with his portable ATV repeater (Rose Parade).

net, each camera position can be told to transmit and zoom in on any problem that may occur. The camera site sends the signal on 439.25 MHz (LSB) to a portable ATV repeater on top of the Landmark Center building in downtown Indianapolis, which relays the picture to the parade command center via 910.25 MHz. In addition, there will be a microwave link to the Channel 8 transmitter site which can relay all of the activities to the K9LPW ATV repeater.

Activities

I'd love to see activity reports from across the country and the world. Please send me photos and a description of ATV operations in your area for possible use in the ATV column. Also please send any interesting circuit and antenna designs we can share with our fellow ATVers.

Remember to look for the weekly Tuesday night ATV net on 3.871 MHz at 8 pm EDT.

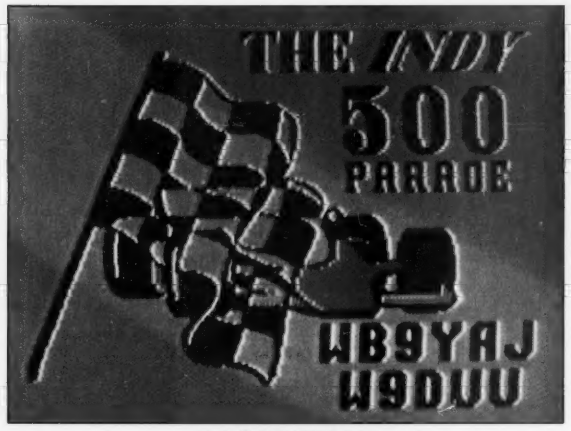

Photo F. INDY 500 Parade.

esting color camera modules available. Their model #56570 (PAL version) and #56571 (NTSC) are extremely small, with C-mount adaptors. These are high resolution and low-light level units (0.2 lux). The B/W versions are models #56470 and #56471. You'll have to provide your own case, but this allows you to build the camera into your own customized configuration. The single quantity price of the color module is $875, but this comes down to $700 if you order 10 or more.

EEV, Inc., has a modular camera with some interesting options, particularly for astronomy or night surveillance work. Although the camera plus options are expensive for average ATVers, their catalog is fun to browse through.

If you have any additional information on a good source of inexpensive B/W or color cameras, please let me

(Amateur Television Network) mounted a massive effort. There were 13 camera positions scattered along the parade route, 2 motorcycle mobile stations, and even a helicopter mobile. These were all linked on 434 MHz to a portable repeater on a tall building which relayed each remote camera to the parade command center via the 1200 MHz band. In addition there was a 10 GHz link to the emergency services command center. Those of you with TVRO satellite dish systems were in for a special treat that year, as they even uplinked all ATV activities on a geostationary satellite so that hams in North America could join in the fun.

This May 27 the Indianapolis ATV group plans to cover the annual INDY 500 Parade. Seven camera positions will be perched atop several skyscrapers overlooking the parade route. By means of a 2-meter coordination

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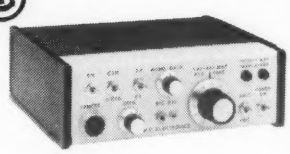

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Be A Ham?

The invisible fraternity.

by James L. Paul N6SIW

As an adolescent, I first became interested in amateur radio after working at a television station in central California. The station engineers were hams and always seemed to be able to communicate with each other, while the regular commercial radio system failed for the rest of us. My knowledge of repeaters was limited to the proper button to press when using the radio in my station vehicle. Even then, I didn't realize the station engineers were hams, and I knew nothing about amateur radio.

After returning to school, I realized that I had taken at least an introductory class in nearly every subject offered at four different colleges, but I had never been exposed to ham radio. Even two years of telecommunication courses in broadcast radio and television hadn't included any mention of ham radio. After leaving the job with the television station and moving to another city, I decided to learn something about ham radio.

Where to Go?

First, I went to a large bookstore. I was shocked to find a total absence of books about ham radio! Next, I visited Radio Shack. Another total absence of ham information. (Radio Shack has since improved somewhat.) On to the public library! By this time, I was beginning to feel as if some sort of conspiracy was going on. I was on the verge of obsession, and called every bookstore in the phone book. I finally found one that carried a couple of ham magazines. After 95 miles round trip, I finally had two ham magazines! Feeling victorious, I opened the pages to read about—you guessed it!—the dwindling ham population!

This stunned me somewhat. Hams worried that not enough people were taking up the hobby? Hams were trying to attract interest and young people? Wow. This was so contrary to my experience that I found it hard to believe at first. I had cultivated the impression that amateur radio was an elite club for members only, and that newcomers were not solicited.

I read through the magazines to find information on how to become a ham. Amazingly, I found nothing. Not one clue for joining this hobby that claimed to be screaming for new people. All the stuff in the magazines was aimed at people who were already in the ham fraternity. I decided to find and talk to a member of the fraternity.

Looking for an Elmer

Soon I was parked outside a house that had a big antenna tower in the yard. Next, I was knocking on the door. This led to attending a meeting of the local ham club. People at the club meetings were polite, but I still felt very much like an outsider. I did get information on licenses, though. I downloaded a Morse code program for my computer, and started practicing.

About this time, I moved again. After settling in, I tried to find out about local ham activities. Nothing in the phone book. Nothing in the local stores. Nothing in the local paper. Sigh. I called the local paper, and asked them to research anything they could find. They had to go back more than 20 years, but they found an article mentioning amateur radio. I called the person named in the article, a past president of the local ham club, and he was able to put me in contact with a current member. Eventually, I was licensed at a hamfest sponsored by that club.

Not on the Menu

So what's my point? It's that I had to actively hunt for amateur radio. Ham radio certainly didn't come looking for me. I think the attitude of hams toward their hobby is significantly different from the viewpoint of nonhams. Many people see ham radio as a "good old boy" fraternity, if they see it at all. Hams speak in tongues and use code, and talk only to each other. Most people have no idea what ham radio really is.

In this age of audio-video bombardment, choices for hobby and sport interests are endless. People choose their interests from the menu that's placed before them, and amateur radio rarely appears on that menu. With all the tempting choices on the menu, why bother to pursue choices that don't appear? To people looking in, amateur radio seems to want to keep people out. Otherwise it would be on the menu, right?

If ham radio were open to all, it would be in the phone book. If club meetings were open to all, they would be in the newspaper. In today's society, if it's not in the phone book, on TV, or in the paper, it doesn't exist. If it's not easy to find, it doesn't want to be found. If it's hard to find out about ham radio when a person *is* trying, it must be hopeless when a person *isn't* trying. Unless people are actively seeking to become hams, they will never think of amateur radio as a hobby.

When was the last time you saw a billboard with a flashy ad and standing invitation from the local club? How many ham clubs are in the local Yellow Pages? And how many schools include amateur radio as part of the curriculum? Even the time and place of most exam sessions are known only to hams. The average American kid never hears about ham radio in school. Without ham radio in their peer group, it doesn't exist as an activity to a kid.

Yes, I know there are exceptions to all this. There always are, usually due to exceptional people.

What the Hobby Needs

Amateur radio has an image problem. I don't know whose fault it is, but it's there. This hobby needs to be marketed. It needs to be packaged and sold. Among the "products on the shelf" competing for a person's time and interest, amateur radio is rarely on the shelf. When it is on the shelf, it's a dusty, unrecognized product with no brand name. We need to slap on a bright new label, and compete in the market for the time and interest of potential ham operators.

How about a short column in the local paper to inform the community of ham activities? Or a small ad in the yellow pages under "clubs"? Such an ad would make ham radio seem more normal, and increase credibility in many people's eyes.

One of the most common ways for a person to take an interest in a hobby is by learning it from someone they know. I had ham friends, however, that I knew for years, and they never told me they were hams until I became a ham myself. This attitude has probably contributed to the problem more than anything else. It suggests that amateur radio is an elite, private club.

Without demand, ham products and magazines will not grace the shelves of many stores much longer. Without products on the shelves, demand is harder to create.

I had to seek amateur radio, even before I knew exactly what it was. I had to go out of my way and overcome several obstacles. Why should people bother, when there are plenty of other things to do?

In short, hams can't wait for people to come to them. Hams must take amateur radio to the people, and make them aware that amateur radio is a superb way for young people to become interested in, and develop expertise in, electronics and radio communications. Though no longer at the vanguard, amateur radio still contributes to technological development. Fewer hams may homebrew their own stations, but they're always coming up with ways to improve existing systems. They are especially good at doing it *cheaply.*

Fellow fraternity members, we must pummel them about the head and shoulders with our hobby. How else will they know we're here? 73

At 25 years of age, James L. Paul N6SIW has been writing computer software commercially for nine years—since he was sixteen. He learned a lot from his parents; both of his parents teach computer science, and his father also teaches physics and chemistry. You may contact him at 4920 N. Backer #221, Fresno CA 93726 or on Compuserve 72767,3436 or GEnie "J.PAUL."

Dx

Hams Around the World

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Where is That Soviet Station?

Possibly one of the most often-asked questions by both neophyte DXers and old-timers is, "How do I determine the DXCC country of a Soviet station?" A typical response would be something like, "Look at the callsign prefix." The structure of the Soviet callsign system appears to be complex and undecipherable, so the above question is not unreasonable, but the typical response is only partially correct.

In most cases, especially for a typical callsign with a prefix beginning with **R** or **U** (UA1AAA, RB5XX, UC2AWA, etc.), it is fairly easy to determine a station's DXCC country if you know the rules. Special event callsigns made of unusual letter combinations (U**Ø**Y, UX4L, RX**Ø**C, etc.) or beginning with letters other than **R** or **U** (EN3D, ER3W, EO**Ø**AAK, etc.) are often difficult to decipher. We'll discuss the latter soon. This month, we'll look at the Soviet callsign system, including what constitutes a typical callsign and a few rules about callsigns in general.

The current method of callsign assignment is very systematic, and after learning just a few simple rules you will be able determine the DXCC country of more than 90% of Soviet stations that you might encounter. Most callsigns issued during the past 20 years have a built-in logic that often identifies the station's location. This includes callsigns issued for club stations, special event stations (1X1, 2X1, special prefixes, etc.), and all typical callsigns beginning with the letters **R** and **U**.

A Few Simple Rules

The Soviet callsign system is based on oblasts or regions. Generally, each region is identified by one or more unique prefix/suffix combinations. Once you are sure that the station is Soviet, you can usually determine its location easily. The Soviet Union is authorized to use callsigns taken from the following ITU-assigned callsign blocks: **EKA-EKZ, EMA-EOZ, ERA-ESZ, EUA-EWZ, EXA-EZZ, LYA-LYZ, RAA-RZZ, UAA-UZZ,** and **4JA-4KZ.**

A typical amateur radio callsign consists of a two-letter and single-digit prefix followed by a two- or three-letter suffix, such as RA**Ø**UI, UM8NA, UM9MNY, UZ4FWD, etc. Callsigns beginning with **RZ** and **UZ** (with a three-letter suffix) are reserved for club stations in the Russian Republic. Outside of the Russian Republic, a club station is identified by the second letter of the suffix. If the second letter is **W, X, Y** or **Z**, then the callsign is assigned to a club station, for example, UA9AZD, UA2FWA, etc.

To determine the DXCC country of a typical callsign, refer to the table. Take UM9MYY, for example. Ignore the first letter of the prefix (U). Locate the second letter, **M** in the table, then check the digit column (in this example the digit is meaningless) and read across to the right to determine the DXCC country. Now determine the DXCC country of UZ4FWD. If you got European Russia, you used the table correctly.

The Soviet callsign structure is complex, but with a few easily-learned keys, you can unravel the secret of the majority of Soviet callsigns. Most countries have based their amateur radio callsign prefixes on geographical or political divisions such as province, state, region, etc., and they use a digit in the callsign prefix to identify where the station is located within the country. In the Soviet Union this is true only in certain areas. The Soviet system has added an additional bit of information that identifies the station's oblast. Before I give you the secret keys, you must first learn some basic facts about the Soviet Union. Not too much, but just enough to help you understand the Soviet callsign system.

The Soviet Union in Particular

The Union of Soviet Socialist Republics (U.S.S.R.), also known as the Soviet Union, is divided into 15 Soviet Socialist Republics (S.S.R.) which are supposedly based on the fifteen most populous and advanced nationality groups in the country. However, not all major nationality groups are represented as union republics because of the way the Soviet constitution is worded, but that's another story. The structure is quite complicated with the country being further divided into various political administrative units such as the S.S.R., autonomous S.S.R. (A.S.S.R.), kray, oblast, autonomous oblast, and others. The oblast and the kray are at the same general level as the A.S.S.R. The other administrative units are of little use to us in the DX game.

The oblast is a unit created purely for administrative convenience, but it holds some significance for amateur radio operators because the Soviets offer an award for confirmed contacts with oblasts. But more importantly, the location (oblast) of most Soviet stations can be determined from the first letter of the callsign suffix.

Most Soviet callsigns assigned during the past 20 years have been issued systematically with the oblast as the key element. This key element—the oblast—is coded into the suffix of all typical callsigns and most special event callsigns. This month we'll concentrate on typical callsigns—those that begin with the letters **U** and **R** and that have the familiar 2x2 or 2x3 format, such as UA1AAA, UB5QR, RV6IAA, etc. We'll tackle special event callsigns next month.

The first letter of the callsign's suffix identifies the station's oblast (geographical area or republic). This means, for example, that all stations operating from the Asiatic Russian Republic that have the letter **Y** following the digit in their callsigns (UA**Ø**YB, RV**Ø**YA, UZ**Ø**YWA, etc.) are ALL located in oblast 159, the Tuva Oblast. The notation "UA**Ø**Y" can then be used to identify this oblast, and a Soviet station operating portable might sign /UA**Ø**Y, /RA**Ø**Y or even U**Ø**Y, which is a legitimate callsign.

This rule provides a method of identifying the oblast, but not the oblast's name or number. This information is obtained from an oblast list or by looking up a similar callsign in the Soviet Union section of the *Radio Amateur Callbook*. If you are serious about unraveling Soviet callsigns, I suggest that you purchase the 15-page *DXNS USSR Oblast Guide* from Geoff Watts, 62 Belmore Road, Norwich NR7 OPU, England. The cost (air-mailed to purchasers outside of England) is $4 or 8 IRCs.

Next month we'll discuss Soviet special event and contest callsigns, and if room permits, unique callsigns/prefixes of other countries. 73

R and U Prefixes
for determining the DXCC country

First Letter	Second Letter	Digit	DXCC Country
R, U	A, V, W, Z	1, 3-6	European Russia
R, U	A, V, W, Z	**Ø**, 9	Asiatic Russia
R, U	A, V, W, Z	2	Kaliningrad
R, U	B, T, Y	Any	Ukraine
R, U	C	Any	Byelorussia
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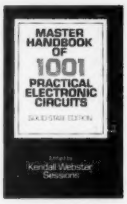

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You can have the world at your fingertips. You'll get the latest station and time grids, the 1990 Buyer's Guide and more. 384 pages. **$14.50**

THE WORLD $4.00

How can the World's Best DX Map cost only $4.00? Obviously, a serious blunder which you should take advantage of before we discover it. This is the only world map in black and white so you can color in the countries as you work them! Further, it has almost all of the official IARU 400 countries on it, which no other map at any price has.

For Better QSOing

These are books that our editors feel are excellent additions to everyone's reading experience. Although they are not necessarily ham radio books, they are thought provoking and timely.

18G01 • **"Surely You're Joking, Mr. Feynman!"**
by Richard P. Feynman
Richard Feynman, who won the Nobel Prize in physics, was one of the world's greatest theoretical physicists and thrived on outrageous adventure. He traded ideas with Einstein and Bohr, discussed gambling odds with Nick the Greek, and accompanied a ballet on the bongo drums. This is Feynman's astonishing life story—a combustible mixture of high intelligence, unlimited curiosity, eternal skepticism, and raging chutzpah. **$8.95**

19M02 • **Chaos, Making a New Science** *by James Gleick*
Chaos records the birth of a new science. This new science offers a way of seeing order and pattern where formerly only the random, the erratic, the impredictable—in short, the chaotic—had been observed. After reading *Chaos*, you will never look at the world in quite the same way again. **$9.95**

20M090 • **Computing Across America**
by Steven K. Roberts N4NRVE
Steve Roberts has written articles for *73 Magazine* about the technical aspects of his US tour on his recumbent bicycle. This book covers his adventures, people he met, and places he saw. If your lifestyle seems a little confining, check this book out. **$9.95**

CODE TAPES

One answer to the no-code brou-ha-ha is to make the code so simple to learn that it's a non-problem. Herewith the world's easiest code course—tens of thousands of hams have gotten their licenses this amazing new shortcut way. It's failure-proof. Most people are able to whip through the Novice test after spending less than three hours each on Genesis and The Stickler. People who have given up on other code courses find this one does the job in a jiffy. Going after your General? It's about time. Use the Back Breaker and you'll be there before you know it. A week should do it. Warning, 20wpm code almost invariably appears to cause irreparable, irreversable, permanent brain damage. Uncle Wayne accepts no responsibility whatever for anything that happens to those who are foolish enough to use the Courageous 20wpm tape.

73T05 **"Genesis"** **$5.95**
5 wpm—This is the beginning tape, taking you through the 26 letters, 10 numbers, and necessary punctuation, complete with practice every step of the way. The ease of learning gives confidence even to the faint of heart.

73T13 **"Back Breaker"** **$5.95**
13+ wpm—Code groups again, at a brisk 13+ wpm so you'll be really at ease when you sit down in front of a steely-eyed volunteer examiner who starts sending you plain language code at only 13 per. You'll need this extra margin to overcome the sheer panic universal in most test situations. You've come this far, so don't get code shy now!

73T06 **"The Stickler"** **$5.95**
6+ wpm—This is the practice tape for those who survived the 5 wpm tape, and it's also the tape for the Novice and Technician licenses. It is comprised of one solid hour of code. Characters are sent at 13 wpm and spaced at 5 wpm. Code groups are entirely random characters sent in groups of five—definitely not memorizable!

73T20 **"Courageous"** **$5.95**
20+ wpm—Congratulations! Okay, the challenge of code is what's gotten you this far, so don't quit now. Go for the extra class license. We send the code faster than 20 per. It's like wearing lead weights on your feet when you run: You'll wonder why the examiner is sending so slowly!

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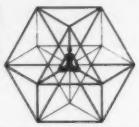

New Talent at *73*

I'm delighted to call your attention to two new people on the *73* editorial staff: Bill Brown WB8ELK, and Mike Nugent WB8GLQ.

Besides being congenial, Bill is a technical whiz. He likes to launch amateur TVs via balloon, kite or rocket and has done so in various places around the world. Our ATV editor for several months, Bill has now joined us here in New Hampshire full time. Besides being deeply into fast-scan TV, Bill has our Amiga working on various SSTV modes, and just got a hi-res weather fax receiver going. Beautiful! Bill's fascination with amateur radio dates back to the earliest days of *73*. He stays right on the leading edge of the hobby, and has gained a lot of respect from those that have worked with him or heard him talk.

Mike Nugent, "Nuge," has been on the scene for a few months. He is the editor of a fine little magazine, *Portable 100*, for RS laptop buffs. Nuge spends half days here with us, delving into packet, and editing. Nuge is a much-sought-after computer wizard, programmer, and problem solver.

You'll be seeing the impact of these new talents in the magazine right away. We're proud to have them aboard. I think you will be, too.

I've been holding forth in this spot for six months. Let's take a look at some feedback:

06 April 1990

73 Magazine; *"K6MH"*
Editorial Offices, WGE Center
Hancock, N.H. 03449

Dear K6MH & Editor of 73,

Your editorial suggestions (p.88 March '90) may be well taken in some cases but the bottom line is that "Ham Radio" is a hobby and therefore means different things to different people. As a hobby, each person is entitled to do his own thing even if it means talking about the new equipment that he just purchased for an arm and a leg. I have since listened across many bands and indeed find all types of subjects being discussed. Most with genuine concern, interest and even humor!

Ham radio has many constraints too. Especially in talking with other countries where the legal rules say ". . . that the subject matter is of such inconsequential interest that commercial facilities would not be used . . ." Further, ham radio is not college or even kindergarten for that matter (?14313 excepted?) and many people have already used their grey matter to stimulate their business interests and just want to "shift gears" for a few minutes or hours of relaxed rag-chewing about any subjects or fluff they want without feeling guilty about it!

I listen on the HF bands more than I talk and I have heard a great many interesting, QSOs. Many more were routine, some were most educational, even brilliant, along with the deteriorating, argumentative, destructive, inane and ignorant—vulgarity that advertises the inferior mental level behind the voice-box of its owner. However in our case this is a hobby being exercised in a free country, by free individuals of wide, if not extreme, diversity but with a common interest in THIS hobby, its equipments, modes, antennae, problems, joys and the so-called cocktail conversations about and between fellow hams. Such discussions shouldn't seem unnatural or undesirable. In fact some people are indeed turned off by discussing politics (Town Meetings), special interest groups, etc. Often the mere mention of Congress, IRS, Supreme Court Decisions, the recent 14313 Mhz self-righteousness, etc., can run a number of people to the boob-tube or the heart specialist instead of our wonderful hobby!

Most of us that could pass the FCC test (up to now) must have enough spunk, success, pride or ambition to decide what "WE" want to talk about and many switch from signal reports to the more interesting but enjoyable topics of "THEIR CHOICE" even if others would not feel inclined to join the QSO. Look at the "ARRL NET DIRECTORY" and see some open, special interest nets for Novices, religions, weather-nets, QCWA, traffic, Round Tables, ARES, R-Vers, Computer Interfacing, Practice, Breakfast Club YL, training, Breezeshooters, AMSAT, "Grandfathers" and the ham groups of former military people and even our Possum Hunters Net! Some would also prefer their own private QSO anyway.

Some may need a prod but for most of us it's "enjoy" or QSY. But PLEASE let's always—"Live & Let Live." OK?

73,
Frank E. Brooks II, W4UMC

Right on with Live and Let Live! I'm wholeheartedly in favor of anything that is alive, exciting, and fun in ham radio. Speaking of which, did you see Bill Brown's suggestion in last month's ATV column for enticing computer addicts into amateur radio, by sharing games and programming directly via ATV?

I'm not crazy about having books recommended to me. But here are two I am so impressed by I feel duty-bound to pass the word along: *Diet for a New America*, by John Robbins (Stillpoint Pub.). An in-depth tour of our food sources, and one of the best books on this planet's ecosystem I have seen. The second is *The Continuum Concept*, by Jean Liedloff, subtitled: Allowing Human Nature to Work Successfully (Addison-Wesley Pub.). John Holt, who has a lot of my respect, said, "If the world could be saved by a book, this just might be the book." Sounds pretty strong. I agree. 73

PROPAGATION

Jim Gray W1XU

Jim Gray W1XU
PO Box 1079
Payson AZ 85541

In general, HF DX during June is in the proverbial doldrums, although with the sunspot numbers nearly at peak, and solar flux high, you may expect June to be a decent, if not spectacular month. However, for you VHFers, June ought to be extremely good, with the MUFs so high.

On a daily basis, the first seven or eight days of the month ought to provide good HF conditions with the bands open well after dark on almost all of the HF bands. June 22 is the longest day of the year in the Northern Hemisphere and dark doesn't usually come until after 9 p.m. local time . . . so you can have a good day of DXing even after working hours! Conditions for the week between the 13th and 20th may be very poor for HF band contacts, with possible solar flares and high magnetic field indexes. Conditions should improve to fair and remain anywhere between fair-to-good and fair-to-poor for the rest of the month.

As always, be sure to keep a daily check on WWV at 18 minutes past the hour to watch for trends in propagation conditions. Remember that a high solar flux and a low A index for the Earth's magnetic field are the good signs to look for. Short skip and sporadic E propagation are likely to abound, and almost daily coast-to-coast propagation will be the rule on bands as high as 10 meters, and maybe even 6 meters on the good days. With Cycle 22 now exhibiting its peak, DX will be better than ever, even in an "off" month like June. For indications of band conditions on any given day, also listen for the DX beacons on the upper HF bands. They will be operating from 10 meters through 20 meters, and if you hear them coming in strong you can bet the band will be excellent. Even if you don't hear signals call "CQ"—you could be pleasantly surprised! 73

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA	—	20	20	—	—	20	20	—	—	—	—	20
ARGENTINA	15	20	20	—	—	—	—	—	—	10	10	15
AUSTRALIA	15	20	20	20	—	40	20	—	—	—	—	10
CANAL ZONE	15	20/40	20/40	20/40	—	20	10	10	10	10	10	15
ENGLAND	40	40	40	—	—	—	15	10/15	10	10/15	15/20	20
HAWAII	15	15	20	20	40	—	20	—	10(1)	10(1)	10	10/15
INDIA	20	—	—	—	—	—	15	15	—	—	—	—
JAPAN	—	20	20	—	—	20	20	—	—	—	—	20
MEXICO	15	20/40	20/40	20/40	—	20	10	10	10	10	10	15
PHILIPPINES	—	—	20(1)	—	—	20	15(1)	10(1)	—	—	—	15(1)
PUERTO RICO	15	20/40	20/40	20/40	—	20	10	10	10	10	10	15
SOUTH AFRICA	20	—	20	20	—	—	—	—	10	10	15	15
U.S.S.R.	—	—	20	20	20	—	—	15	15	—	20	20
WEST COAST	20	20/40	20/40	40	40	40	10	10	10	10	10	15

CENTRAL UNITED STATES TO:

ALASKA	10(1)	20	20	20	—	—	20	—	—	—	15	10/15
ARGENTINA	15	15	20	20	—	—	—	10	—	10	10	10
AUSTRALIA	10	15	20	20	20	20/40	20	20	—	15(1)	10	10
CANAL ZONE	15	20/40	20/40	20/40	—	—	10	10	10	10	10	10
ENGLAND	—	—	—	—	—	—	—	15	10(1)	15	20	20
HAWAII	10/15	15	20	20/40	20/40	20/40	20(1)	—	—	10	10	10
INDIA	15(1)	20(1)	—	—	—	—	20(1)	15(1)	—	—	—	—
JAPAN	10(1)	20	20	20	—	—	20	—	—	—	15	10/15
MEXICO	15	20/40	20/40	20/40	—	—	10	10	10	10	10	10
PHILIPPINES	10(1)	—	20(1)	—	—	—	20(1)	15	15	—	—	10(1)
PUERTO RICO	15	20/40	20/40	20/40	—	—	10	10	10	10	10	10
SOUTH AFRICA	—	—	20	—	—	—	—	—	10	10	15	20
U.S.S.R.	—	—	20(1)	—	—	—	—	15(1)	15(1)	20	20	20

WESTERN UNITED STATES TO:

ALASKA	10	10/15	—	20	20	20	20(1)	20	—	—	—	10/15
ARGENTINA	10	15	20	20	20	—	—	—	10	—	10	10/15
AUSTRALIA	10	10	15	20	20	20/40	40	20	20	—	10	10
CANAL ZONE	15	15	20/40	20/40	20	—	—	10/20	10	10	10	10
ENGLAND	—	—	—	—	—	—	—	—	15	15	20	20
HAWAII	10	15	15	20	20/40	40	40	—	15	15	—	10
INDIA	15(1)	15(1)	20(1)	—	—	—	—	20(1)	15(1)	—	—	—
JAPAN	10	10/15	—	20	20	20	20(1)	20	—	—	—	10/15
MEXICO	15	15	20/40	20/40	20	—	—	10/20	10	10	10	10
PHILIPPINES	15	—	—	20	20	20	20	20	20	20	20	15
PUERTO RICO	15	15	20/40	20/40	20	—	—	10/20	10	10	10	10
SOUTH AFRICA	20	20	20	20	—	—	—	—	10	10	15	20
U.S.S.R.	—	—	—	20(1)	20(1)	—	—	20(1)	15(1)	15(1)	20	20
EAST COAST	20	20/40	20/40	40	40	40	10	10	10	10	10	15

Note: (1) Possible on some days.
Use 10 for 10 & 12 meter bands; use 15 for 15 & 17 meter bands; use 40 for 30 & 40 meter bands. Where 2 bands are shown, try both. This data is for the highest possible frequency to be used of a given path. (MUF)

JUNE 1990

SUN	MON	TUE	WED	THU	FRI	SAT
					1 G	2 F
3 G	4 G	5 G	6 G	7 G	8 G	9 G
10 G	11 G-F	12 F-P	13 P	14 P	15 P	16 P
17 P	18 P	19 P	20 P-F	21 F	22 F-G	23 G-F
24 F	25 F	26 F	27 F-G	28 F	29 F-P	30 P

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Dual Band VHF/UHF Trunk Mountable FM Transceiver

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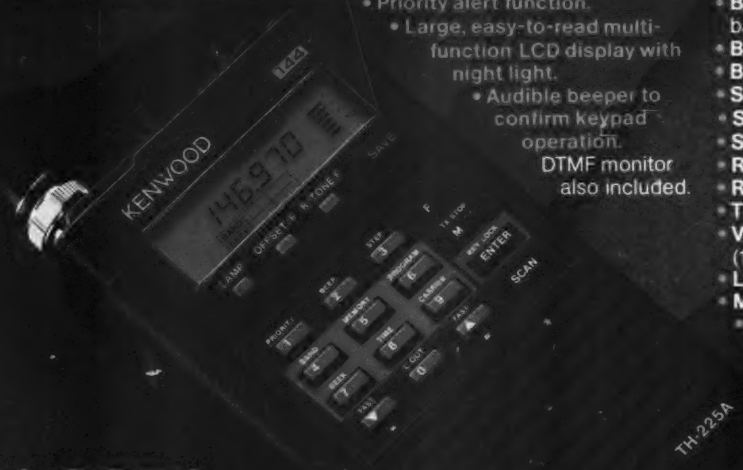

- Priority alert function.
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DTMF monitor also included.

- **BT-5:** AA cell manganese/alkaline battery case
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- **SMC-32:** mini speaker microphone
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- **RA-3, 5:** telescoping antennas
- **RA-8B:** StubbyDuk antenna
- **TSU-4:** CTCSS decode unit
- **VB-2530:** 2m, 25 W amplifier (1–4 W input)
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- **PB-12:** 12 V, 500 mAH NiCd pack

TH-315A/TH-415A

- TH-315A covers 220–225 MHz, TH-415A covers 440–449.995 MHz.
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